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ANNOTATED BIBLIOGRAPHY ON OPIUM AND ORIENTAL POPPIES AND RELATED SPECIES

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ANNOTATED BIBLIOGRAPHY ON OPIUM AND ORIENTAL POPPIES AND RELATED SPECIES

Emil 1906-

By James A. Duke, Charles R. Gunn, Elmar E. Leppik, Clyde F. Reed,
Marie L. Solt, and Edward E. Terrell [1]

ACKNOWLEDGMENTS

The botanists who prepared this bibliography acknowledge the encouragement of John L. Creech, director, National Arboretum; Quentin Jones, staff scientist, National Program Staff; and John G. Moseman, chairman, Plant Genetics and Germplasm Institute, ARS. Sincere thanks are extended to the many patient and helpful staff members of the National Agricultural Library and other libraries who furnished publications that facilitated the completion of this bibliography.

INTRODUCTION

For nearly 2 years, scientists with the Plant Taxonomy Laboratory of the Plant Genetics and Germplasm Institute, ARS, have been studying opium and oriental poppies and their allies: *Papaver bracteatum* Lindl. (great scarlet poppy), *P. glaucum* Boiss. & Hausskn. (tulip poppy), *P. intermedium* DC., *P. lasiothrix* Fedde, *P. lateritium* C. Koch, *P. monanthum* Trautv., *P. oreophilum* Rupr., *P. orientale* L. (oriental poppy), *P. paucifoliatum* (Trautv.) Fedde, *P. pilosum* Sibth. & Sm. (olympic poppy), *P. rhoeas* L. (field or shirley poppy), *P. setigerum* DC., and *P. somniferum* L. (opium poppy). These species are important in the study of narcotics and narcotic antagonists.

During these studies, our review of many publications culminated in this selective bibliography. We believe that this bibliography will serve many concerned citizens and scientists in the campaign to curb drug abuse in the United States. Although we may have overlooked some important articles, this bibliography has been designed for periodic revision. Therefore, the authors would appreciate copies

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[1] J. A. Duke is chief and C. R. Gunn and E. E. Terrell are botanists of the Plant Taxonomy Laboratory; E. E. Leppik is botanist with the Germplasm Resources Laboratory; C. F. Reed and M. L. Solt are contractors for the Plant Taxonomy Laboratory, Plant Genetics and Germplasm Institute, Northeastern Region, Agricultural Research Service, Beltsville, Md.

or citations of any papers that deal with these species and that have not been included in this list. You may forward them, along with suggestions for updating material, to the Plant Taxonomy Laboratory, Plant Genetics and Germplasm Institute, Agricultural Research Service, Beltsville, Md. 20705, USA.

Entries have been numbered serially for indexing. They are arranged alphabetically by author, followed by date of publication, title (original language abbreviated parenthetically for articles not in English), publication data, and call number at the National Agricultural Library (NAL). Call numbers at other libraries have been used when articles were not readily available in the National Agricultural Library (BT -- Boyce Thompson Institute for Plant Research Library; CDA -- Canada Department of Agriculture, Ottawa; FDA -- Food and Drug, Bureau of Medicine Library; LC -- Library of Congress; MAM -- Mid Atlantic Regional Medical Library; SI -- Smithsonian Institution; VA -- Veterans Administration). Where appropriate, annotations have been given. Unverified entries are preceded by an asterisk, the annotation having been extracted from a published abstract.

The computer-compatible serial numbers, designed to facilitate cross reference, led to the inclusion of a few extraneous references. Some floras are included to expedite geographical and phenological inquiries. Some medical and legal literature has also been included. Keywords are indexed for selective searches.

In preparing the annotations, we often used the cited author's varietal designation (including trinomials) and followed the author's usage of the terms "variety," "strain," "race," "form," and "cultivar," without critical evaluation. The use of certain plant and chemical names does not necessarily reflect USDA usage. Used alone in the annotations, the term "poppy" generally denotes Papaver somniferum, not the poppy genus or family.

Each author of this publication (arranged alphabetically) made substantial contributions. James A. Duke administered the project, acquired recent publications, and assisted in abstracting and indexing narcotic and agronomic papers. Charles R. Gunn served as the liaison to the NAL, abstracted papers related to seed studies, and assisted greatly in critical reading. Elmar E. Leppik translated pertinent parts of the Slavic language papers. Clyde F. Reed provided a preliminary set of abstracts and assisted in document acquisition and in the final review and indexing. Marie L. Solt brought together all contributions, placed them in a uniform style, and provided the final annotations and keywords. Edward E. Terrell sorted the documents into subject categories, concentrating on nomenclatural and taxonomic publications, and assisted in the final review.

AVAILABILITY OF CITED REFERENCES

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The noncirculating materials are available for use in NAL or its designated reading rooms in the Washington, D.C., area.

0001. *ABRAHAM, A.C., and J. RAE. 1923. The loss of morphine in powdered opium by keeping. Pharm. Jour. 111: 28-30.

Opium contains both oxidizing and reducing agents; abundant air causes oxidation, reducing the morphine content.

0002. ABRAMS, L. 1944. Illustrated Flora of the Pacific States, Washington, Oregon and California. Stanford University Press, Stanford, Calif. 635 pp. 455.8 Ab8.

Papaveraceae (pp. 223-232) include _P. californicum_, _P. somniferum_, _P. rhoeas_ and _P. argemone_.

0003. ABRIAL, C. 1924. Notes on the culture of marjoram, poppy, celery and teasel. (Fr). Compt. Rend. 4e Congres Nat. Cult. Pl. Med. Paris pp. 43-56. 71 C762.

Cultivation details of the white poppy in France with emphasis on large capsules.

0004. ABROL, Y. P. 1966. Occurence of linamarin and lotaustralin in Iceland poppy (_Papaver nudicaule_ Linn.). Indian J. Chem. 4: 251-252. 385 In294.

These glucosides were formed when 10 day seedlings were fed L-valine and L-isoleucine.

0005. ACHESON, R. M., J. L. HARPER, and I. H. MCNAUGHTON. 1956. Distribution of anthocyanin pigments in poppies. Nature 178: 1283-1284. 472 N21.

Pigments were investigated in petals of _P. rhoeas_, _P. dubium_, _P. lecoqii_, _P. argemone_ and _P. hybridum_. Their distribution supports morphological grouping.

0006. ACHESON, R.M., C. L. JENKINS, J. L. HARPER, and I. H. MCNAUGHTON. 1962. Floral pigments in _Papaver_ and their significance in the systematics of the genus. New Phytol. 61(3): 256-260. 450 N42.

Chromatographic analysis of floral pigments of 21 species of _Papaver_ revealed cyanidin, pelargonidin derivatives and yellow non-anthocyanin compounds. Distribution of the pigments supports Fedde's division of the genus into sections.

0007. AHMAD, S. 1956. Fungi of West Pakistan. Biol. Soc. Pakistan, Monogr. 1: 1-126. 442.9 B526.

Peronospora arborescens was found on leaves of Papaver somniferum and P. rhoeas at Lahore, also Entyloma fuscum on P. rhoeas.

0008. AIMUKHAMEDOVA, G. B., and G. M. KORNEVA. 1962. Application of ultrasonics to the extraction of compounds from plants. (Rus). Izv. Akad. Nauk Kirg. SSR, Ser. Estestv. I Tekhn. Nauk 4(6): 17-24. 511 AK195I.

Disintegrating the plant cells by ultrasonic vibrations extracted 60% of the morphine but prolonged vibration resulted in decomposition.

0009. AKCASU, A. 1952. The changes experienced by the narcotics monopoly in Turkey. Bull. Narc. 4(1): 6-9. LC: HV5800 B8.

Enumerates Turkish laws since 1933 controlling opium production and sale.

0010. AKSANOWSKI, R., M. JURZYSTA, J. KRACZKOWSKA, and Z. WIERZCHOWSKI. 1962. The alkaloids of the medicinal poppy (Papaver somniferum L.) during vegetation. (Pol; summ. Rus and Eng). Diss. Pharm. 14(1): 47-58. MAM: PO 257J

Alkaloid content was followed in various parts of the plant during growth. The maximum is attained in the ripe fruit with 20-25% of the dry mass.

0011. ALEKSANDROV, V. G., and O. G. ALEKSANDROVA. 1932. Comparative anatomical study of the capsule structure in different representatives of the opium poppy. (Rus). Trudy Prikl. Bot. Ser. 3, 2: 316-350. 451 R92P.

In several races of P. somniferum, types with high opium content have latex tubes of the largest diameter. A small proportion of sclerenchyma and a dense network of vascular bundles also indicates a variety containing high opium.

0012. ALEKSANDROV, V. G., and V. I. VISLOUKH. 1934. Principal features of structure of different organs of opium poppy (Papaver somniferum L.) and the distribution of latex ducts in these organs. (Rus; summ. Ger). Bot. Zhurn. SSSR. 19(2): 141-162. 451 R923.

Latex ducts are associated with vascular tissue except in the root where they occur in the bark. They are least developed in the stems and most prominent in the capsules. Opium races of poppy have more numerous ducts than those grown for oil.

0013. *ALEKSEEV, A. 1927. Materials for the fungus flora of the Tatary Republic. (Ger). Izv. Kazansk. Inst. Sel'sk. Khhoz. i Les. 1: 60-97.

Heterosporium groenlandicum Allesch. causes spots on P. somniferum in USSR.

0014. ALEXANDER, H. G. 1925. Asia's struggle against opium. Contemp. Rev., London 127: 460-465. LC: AP4 C7.

The problems of opium eating in India and the Chinese military governors' encouragement of opium cultivation is discussed.

0015. ALEXANDER, I. 1952. Developmental studies in the flowers of Cruciferae and Papaveraceae. (Ger). Planta 41: 125-144. 450 P693.

0016. ALI, M. A. 1963. Possibilities of cultivation of opium-poppy in East Pakistan. Agr. Pakistan 14(2): 185-199. 22 Ag832.

The opium poppy requires irrigation in East Pakistan and is subject to "damping off" and black ring disease. Yields are not so high as in West Pakistan or India.

0017. ALLEN, A. G., and B. D. FRAPPELL. 1970. The production of oil poppies. Tasmanian J. Agric. 41(2): 89-94. 23 T182T.

General cultivation practices in Tasmania.

0018. ALLEN, I., JR., and J. S. BUCK. 1930. Papaverine: An attempted Rugheimer synthesis. J. Amer. Chem. Soc. 52: 310-314. 381 Am33J.

The method was unsuccessful.

0019. AL-RAWI, A. 1964. Wild plants of Iraq with their distribution. Tech. Bull. 14. Government Press, Baghdad. 232 pp. SI: QK353 A45W.

There are 18 species of Papaver including P. glaucum (pp. 22-23).

0020. ANDERSON, R. N. 1968. Germination and establishment of weeds for experimental purposes. Weed Society of America, Urbana, Ill. 236 pp.

Germination requirements of several species of poppies on pp. 123-124.

0021. ANDERSSON, G. 1941. About the growing of poppy in Sweden. (Swed). Lantm. Svenskt Land 25(17): 369-370. 11 L234.

0022. ANDERSSON, G. 1953. Svalöf Flora poppy. (Swed; summ. Eng). Sveriges Utsädesfören. Tidskr. 63(1): 56-62. 61.9 Sv23.

This variety, resulting from a cross of 2 German varieties, Mahndorfer and Peragis, is superior in productivity and yields a 10% increase in oil content.

0023. ANDERSSON, G. 1959. Slalöfs original Flora II poppy. (Swed; Eng. translation). Sveriges Utsädesfören. Tidskr. 69: 231-236. 61.9 Sv23.

Flora II, a selection of Flora I, has a higher seed yield, stiffer stalk and ripens 1 day earlier than Flora I.

0024. ANDERSSON, G., and B. LÖÖF. 1966. Increasing the cropping value of the poppy through breeding. (Ger). Pharmazie 21: 240-245. LC: RS1 P673.

The progeny of 5 crosses had higher morphine content than their parents. Since poppy cultivation for morphine is unprofitable, higher seed yield and oil content should be the objectives of breeding programs.

0025. ANDERSSON, G., and G. OLSSON. 1947. Some research experiments with poppies to determine the variety and variation in oil content. (Swed; summ. Eng). Sveriges Utsädesfören. Tidskr. 57: 92-104. 61.9 Sv23.

Two German varieties, Mahndorfer and Peragis, showed variation in oil content between different years with some correlation between the oil of the seed and the mean temperature in the month of August.

0026. ANDERSSON, G., and G. OLSSON. 1948. Oil plants. *In*: Svalöf 1886-1946, history and present problems. 388 pp. Lund.

Production of oil from *P. somniferum* seed in Sweden. Cultivation of white-seeded varieties for flavoring bread (pp. 176-178).

0027. ANDERSSON, G., and G. OLSSON. 1950. The frost hardiness of spring-sown oil crops. (Swed; summ. Eng). Sveriges Utsädesfören. Tidskr. 60(2): 225-229. 61.9 Sv23.

Plants of *P. somniferum* were exposed to temperatures of -6 to -8 degrees C. at the seedling and 3 leaf stage. At the seedling stage 46% were undamaged while at the 3 leaf stage 21% were undamaged.

0028. ANDRASFALVY, A. 1966. Mendelian factors of photoperiodic response in poppy. pp. 231-235. In G. Mendel Memorial Symposium 1865-1965, Brno, Czech. Czech. Acad. Sci., Prague, Czech. QH431 M4.

A variety, Madurovic, was unusually early and flowered even if sowed in late summer in spite of shortening photoperiods. Crossing this variety resulted in suppression of the day neutrality in F_1 but it did appear in F_2 and backcrosses indicating its recessive nature.

0029. ANDRASFALVY, A. 1968. Analysis of the photoperiodical response of poppy. I. Experimental distinction of the types of photoperiodical response. Acta Agron. Acad. Sci. Hung. 17(1-2): 83-99. 19 Ac8.

Among 50 cultivated varieties, one very early flowering variety was indifferent to day length. The vegetative period of the other varieties varied according to their geographical origin and were long day types.

0030. ANDREEV, V. S. 1963. Biogenesis of opium poppy alkaloids. (Rus; summ. Eng). Moskov. Obshch. Isp. Priorody. B. Otl. Biol. 68(4): 106-117. 511 M85.

Triploids and tetraploids have a higher content of morphine but slightly less total quantity of alkaloids in their dry bolls. A scheme of biogenesis of the alkaloids is suggested.

0031. ANDREEV, V. S. 1963. The increase of morphine content in polyploids of the common poppy (Papaver somniferum L.). (Rus). Dokl. Akad. Nauk SSSR 148(1): 206-209. 511 P444A.

Examination of 6 varieties from Central Asia and USSR showed that the yield and content of morphine per unit area is 2 times higher in polyploids than in diploids.

0032. ANDREWS, A. C. 1952. The opium poppy as a food and spice in the classical period. Agric. Hist. 26: 152-155. 30.98 Ag8.

In certain parts of Europe poppy seed remains have been found as far back as the Neolithic age showing continuous cultivation from then to the present. Use by the Greeks and Romans is discussed.

0033. ANGELL, H. R. 1950. Seedling blight. II. Soil in relation to seedling blight of opium poppy and peas. Austral. J. Agric. Res. 1: 132-140. 23 Au783.

Liming the soil controls seedling blight, Pythium ultimum, in Australia.

0034. ANGELL, H. R. 1951. Seedling blight. IV. Effects of sources of isolates of Pythiaceae on percentage stands of poppies and peas on four steamed soils. Austral. J. Agric. Res. 2: 286-294. 23 Au783.

Pot experiments testing the pathogenicity of 2 species of _Pythium_ on reinfested steamed soil.

0035. ANGELL, H. R. 1952. Seedling blight. VI. The effect of mixtures of unsterilized soils and of reinfesting steamed soils on seedling blight of poppies and peas. Austral. J. Agric. Res. 3: 128-136. 23 Au783.

Soil of different seedling blight potential were used in various combinations in pot experiments.

0036. ANGELL, H. R., and K. L. HILLS. 1951. Seedling blight. III. Control of seedling blight of opium poppy by liming. J. Austral. Inst. Agric. Sci. 17: 17-34. 23 Au74.

Lime provided effective control of seedling blight due to _Pythium_ strains in the field, especially when worked into soil before seeding.

0037. ANNELER, E. 1936. The determination of codeine, narcotine, papaverine and thebaine in opium. (Ger). Festschrift Herrn Emil Christoph Barell, Basel, pp. 344-362. LC: RS41 F4.

Percentages of the alkaloids in samples of opium from Turkey, Russia and Persia.

0038. ANNETT, H. E. 1920. LV. Factors influencing alkaloidal content and yield of latex in the opium poppy (_Papaver_ _somniferum_). Biochem. J. 14(5): 618-636. 382 B52.

Factors studied were the number and method of lancings, stage of development, number of capsules, climate, season and use of fertilizers.

0039. ANNETT, H. E. 1921. Some experience with poppy growers in the United Provinces. Agric. J. India 16(1): 19-23. 22 Ag83.

The low morphine content of Indian opium was attributed to the many lancings in which the morphine progressively decreased. In an effort to obtain opium from the first lancing, the cultivators were rewarded but only half of them complied.

0040. ANNETT, H. E. 1921. Investigations on Indian opium, No. 2. The effect of environmental factors on the alkaloid content and yield of latex from the opium poppy (Papaver somniferum) and the bearing of the work on the functions of alkaloids in plant life. Mem. Dept. Agric. India, Chem. Ser. 6(2): 61-154. 385 In2.

Terminal capsules produce opium of higher morphine content than lateral. Age of capsule has little effect on percentage of morphine provided it is more than 8 days from flowering. Percentage of morphine is not affected by weather or fertilizer but it does affect the yield of opium. Author concludes opium is a useless end-product of metabolism.

0041. ANNETT, H. E., and M. N. BOSE. 1922. Investigations on Indian opium, No. 3. Studies in the meconic acid content of Indian opium. Mem. Dept. Agric. India, Chem. Ser. 6(6): 215-221. 385 In2.

Meconic acid content varies directly as the total alkaloid content and is present in sufficient amount for the alkaloids to be combined as meconates. Soluble sulphate content of latex increases as alkaloid decreases.

0042. ANNETT, H. E., H. D. SEN, and H. D. SINGH. 1921. Investigations on Indian opium. I. Non-environmental factors influencing the alkaloidal content and yield of latex from the opium poppy (Papaver somniferum). Mem. Dept. Agric. India, Chem. Ser. 4(1): 1-60. 385 In2.

The yield of opium depends more on the size of capsule and vigor of the plant than the method of lancing, number of incisions, length of incision and time of day. The Turkish method of spiral incisions gave no larger yield than the Indian method of vertical incisions.

0043. ANNETT, H. E., H. D. SEN, and H. D. SINGH. 1921. A survey of the Indian poppy-growing districts for morphine content of the opium produced. Pusa, Agric. Res. Inst., Bull. No. 116: 1-9. 22 P97.

Indian grown poppies yield at least 9.5-10% morphine calculated on dry opium, provided the first lancing only is used. This is necessary for medical preparations as prescribed by the British Pharmacopoeia.

0044. ANNETT, H. E., and H. D. SINGH. 1922. The loss in morphine content of powdered opium in storage. Pharm. J. 109: 304-305. 396.8 P49.

Powdered opium lost 3% of its morphine in 4 years of storage. Moist opium does not show this loss.

0045. ANONYMOUS (C. B.). 1910. The culture of opium poppy in China and Indochina. (Fr). Schweiz. Wochenschr. 1910: 639-641. 396.8 Sch9.

The various grades of opium used for medicine, smoking and eating are discussed including the value of each and production figures.

0046. ANONYMOUS. 1919. Oriental poppies at Wisley, 1917. J. Roy. Hort. Soc. 45: 120-124. 84 L84J.

Report of the trials of 80 stocks of oriental poppies with descriptions and awards.

0047. ANONYMOUS. 1919. Annual poppies at Wisley, 1917. J. Roy. Hort. Soc. 43: 483-487. 84 L84J.

A report of trials of 56 stocks of annual poppies with brief descriptions of the varieties and awards.

0048. ANONYMOUS. 1919. The Iceland poppy. Gard. Chron. Amer. 23: 162. 80 G132.

Garden cultivation of P. nudicaule.

0049. *ANONYMOUS. 1919. Egyptian opium. Repert. Pharm. 74: 345. (Pharm. Jour. 102: 219).

White-flowered variety of P. somniferum cultivated chiefly in islands of upper Egypt; seed sown in October and November, the inspissated juice collected in February and March and the finished opium containing 7-15% morphine.

0050. ANONYMOUS. 1920. The sunbeam poppies. Florists' Exch. 50: 159. 80 F666.

A giant form of the Iceland poppy that has value as a cut flower.

0051. ANONYMOUS. 1920. The Shirley poppy. Florists' Exch. 49: 1319. 80 F666.

Possibilities of the Shirley poppy as a cut flower.

0052. ANONYMOUS. 1921. The red poppy for Memorial Day. Florists' Exch. 51: 136. 80 F666.

As a substitute for P. rhoeas whose distribution is prohibited, it is suggested that the Shirley poppy (variety of P. rhoeas) or the tulip poppy (P. glaucum) be used for Memorial Day.

0053. ANONYMOUS. 1941. Poppy seed as a commercial crop. Florists' Exch. 96(11): 8. 80 F666.

Possibilities of growing the crop in the U.S.

0054. ANONYMOUS, (J. G. J. D.). 1943. Unusual plant seed oils. Manuf. Chem. 14(12): 397. 396.8 M31.

Characteristics and utilization of poppy seed oils.

0055. ANONYMOUS. 1949. Notes from Boghall. I. Scott. Agric. 29(1): 54-57. 10 Sco82So.

Trials of strains of oilseed poppies.

0056. ANONYMOUS. 1950. Hormone preparations for the control of weeds. (Dan). Dansk Frøanl 33: 111-112. Canada Dept. Agric. Libr.

A list of sprays and powders with directions for use is given but white poppy is highly susceptible to these herbicides.

0057. ANONYMOUS. 1951. Comparative trials with oil-seed crops. (Dan). Tidsskr. Planteavl 54: 351-352. 11 T439.

Comparison of poppies grown on clay and peat soils in Denmark. Seed yield: clay 13.4 hkg/ha, peat 7.7. Oil yield: clay 551 kg/ha, peat 316.

0058. ANONYMOUS. 1968. Morphine manufacture from poppy straw and its concentrate. Bull. Narc. 20(2): 50. LC: HV5800 B8.

From 1962-66 there has been a trend for increasing manufacture of morphine from opium compared to straw (and its concentrate). Poppy straw concentrate was produced in Argentina, Netherlands and Poland and exported.

0059. ANTHONY, K. R. M., and F. R. MOORMANN. 1965. Agricultural problems and potentialities of a hill tribe area in Thailand. Trop. Agric. (Trinidad) 42(2): 97-104. 26 T754.

Perennial bush or tree crops are considered the most promising replacement for opium poppies in Tak province, a region of shifting cultivation.

0060. APPELQVIST, L. A. 1967. Further studies on a multisequential method for determination of oil content in oilseeds. J. Amer. Oil Chem. Soc. 44(3): 209-214. 307.8 J82.

The mean values from official methods agreed well with the values from the multisequential method used in Sweden.

0061. ARBER, A. 1938. Studies in flower structure. IV. On the gynaeceum of Papaver and related genera. Ann. Bot. (London) 2(7): 649-663. 450 An7.

Basic structure of the gynoecium, with detailed account of the inverted portions of the placental bundles.

0062. ARIMA, Z., and M. IWAKIRI. 1938. Manchurian opium. I. Analysis of the main alkaloids. (Jap). Rept. Inst. Sci. Res., Manchoukuo 2: 221-230. 513 T18.

0063. *ARIMA, Z., and M. NINOMIYA. 1938. On the production of poppy seed in Manchoukuo. I. (Jap; summ. Ger). Rept. Inst. Sci. Res. Manchoukuo 2: 45-46. 513 T18.

Seed in Manchuria (Jehol Prov.) is yellow to brown, 1000 seeds per 0.39 g with oil content 43-45%; oil extracted by pressing cold seeds which yield a light colored oil, acid number 2.1 suitable for cooking; then by pressing the residue at 60°-70°C yield a dark oil, acid number 5.9 suitable for technical use; total oil yield 40.1%.

0064. ARIMA, Z., and M. NINOMIYA. 1938. Use of poppy seeds in Manchoukou. I. (Jap.). Rept. Inst. Sci. Res. Manchoukou 2: 237-243. 513 T18.

Manchoukuo poppy is cultivated for opium but the seed yields 43-45% oil and the chemical composition is given. The press cake, rich in nitrogen and phosphorous, is excellent fodder and fertilizer.

0065. ARKADJ'EVA, G. F., K. F. BLINOVA, and M. N. KOMAROVA. 1966. On the evaluation of the antibiotic activity of some medicinal plants of Tibetian medicine. (Rus). Rast. Resur. 2(2): 218-223. 450 R18.

P. nudicaule has no antibiotic activity.

0066. ARNAUD, G., and H. DARPOUX. 1945. Diseases of oleaginous plants. (Fr). Compt. Rend. Seances Acad. Agric. France 31: 64-65. 14 P215Bc.

P. somniferum is attacked by Helminthosporium papaveris at all stages. Peronospora arborescens and Oidium are not important in France.

0067. ARNOLD, C. G. 1958. Antibiotic substances from plant seeds. (Ger). Z. Bot. 46(5-6): 516-549. 450 Z32.

General article which includes P. somniferum.

0068. ASAHINA, H., T. KAWATANI, M. ONO, and S. FUJITA. 1957. Studies of poppies and opium. Bull. Narc. 9(2): 20-33. LC: HV5800 B8.

Comprehensive article covering all aspects of poppies in Japan, including: analysis of opium of P. setigerum, chromosome and alkaloid content of a natural hybrid of P. setigerum x P. somniferum, examination of many species and varieties for morphine, areas of opium poppy cultivation and the morphine content of Japanese opium.

0069. ASAHINA, H., and M. ONO. 1956. Quantitative determination of morphine in opium by paper chromatography and spectrophotometry. Bull. Narc. 8(4): 39-44. LC: HV5800 B8.

Individual capsules were analyzed for the amount of morphine in the opium and the effect of several lancings. The Japanese method of multiple scarification results in a lower morphine content than that of countries which bleed the capsules only once.

0070. ASAHINA, H., and M. ONO. 1958. Ultraviolet absorption spectra of opium samples. I. Differences between ultraviolet absorption spectra and absorbance ratios of opium samples obtained by successive lancings. (Jap; summ. Eng). Bull. Natl. Inst. Hyg. Sci. (Tokyo) 76: 103-107. LC: 499.074 K33S.

Differences in the absorption of opium from successive lancings were observed and might be used for the identification of the quality of samples.

0071. *ASAHINA, H., M. ONO, and K. TAKAHASHI. 1961. Quantitative determination of morphine in opium by means of artificial methods. (Jap; summ. Eng). Bull. Natl. Inst. Hyg. Sci. (Tokyo) 79: 107-110.

The various methods for quantitative determination of morphine in opium given in various Pharmacopoeias are discussed and reasons given for their apparent differences.

0072. ASGHAR, S. S., and M. SIDDIQI. 1970. Phenolase of Papaver somniferum. I. Isolation of the enzyme and its substrate specificity. Enzymologia 39(5): 289-306. 390.08 En9.

0073. ASHIMKANOV, K. 1962. Effect of mineral fertilizers on dynamics of growth and yields of medicinal poppy. (Rus). Frunze, Izdatel'stvo Akad. Nauk Kirgizsloi SSR. 55 pp. 57.7 As3.

Popular article on the need of fertilizer by the poppy plant. More nitrogen is needed in the first half of the vegetative stage than in the second half.

0074. ATANASOFF, D., D. N. DODOV, I. K. KEYAEHEVSKI, S. I. MARTINOV, V. TRIFONOVA, and A. KHRISTEV. 1932. Parasitic fungi new for Bulgaria. III. (Bulg; summ. Eng). God. Sofijsk. Univ. Agron. Fakult. 10: 341-366. 423 B18E.

Of the new fungi listed, Erwinia papaveri causes brown spots on P. somniferum. Viability was retained on poppy seeds for 20 months.

0075. AUERSCH, O. 1960. The cabbage moth (Mamestra brassicae L.) as a pest on poppy. (Ger). Anz. Schädlingsk. 33(12): 186. 421 An9.

Larvae damage the leaves.

0076. AVRAMOFF, C. 1945-1946. Investigation of the cultivation of poppy (Papaver somniferum) in Bulgaria. (Bulg; summ. Rus and Fr). Zemedel. Nauka, I. Zemedel. 1(1): 157-194. 21 Z43.

Morphological variations were studied in poppies grown in different regions of Bulgaria. Various subspecies are discussed and agronomic recommendations given.

0077. AWE, W. 1937. Seed oil of the common field poppy. (Ger). Naturwissenschaften 25: 366. 474 N213.

Seeds of P. rhoeas yield 22% of a non-toxic oil which resembles oil from P. somniferum.

0078. AYERS, L. C. 1954. An unusual method of fruit dehiscence in Papaver orientale. Proc. South Dakota Acad. Sci. 32: 39-40. (1953). 500 So82.

Dehiscence in the capsule is brought about by the formation of a double layer, in which cells separate, allowing the stigmatic disc to lift from the ovary wall. This form of dehiscence is unusual, since drying is secondary.

0079. BACKER, C. A., and R. C. BAKUIZEN VAN DEN BRINK, JR. 1963. Flora of Java, Vol. I. N. V. P. Noordhoff, Groningen, Netherlands. 648 pp. 460.21 B12Fe.

The Papaveraceae on pp. 176-178 include P. nudicaule, P. somniferum, and P. rhoeas.

0080. BAGGE, H. 1946. A comparison of the yields of barley, corn, peas, brown beans, soybeans, oil flax and opium poppy, 1940-1944. (Dan). Tidsskr. Planteavl 50: 676-731. 11 T439.

0081. BAGGE, H. 1948. Cultural trials with opium poppy 1941-1946. (Dan). Tidsskr. Planteavl 51: 587-615. 11 T439.

Six years of trials in Denmark show that the best sowing date is April 1, the spacing should be 40-45 cm in loam and 60 cm in sandy soil, 2 kg seed/hectare used for sowing and the plants thinned.

0082. BAGGE, H. 1950. Experiments with opium poppies, 1941-1947. (Dan). Tidsskr. Planteavl 54: 81-92. 11 T439.

In these trials in which Danish, Dutch and German varieties were tested, the highest yields were obtained from the German variety Mahndorfer.

0083. BAGGE, H. 1950. Trials with oil plants 1942-1949. (Dan). Tidsskr. Planteavl 54: 107-114. 11 T439.

Data on yield of seed and crude fat from oil plants including poppy grown on field and marsh soils.

0084. BAGGE, H. 1953. Manurial trials with linseed and opium poppy. (Dan). Tidsskr. Planteavl 56(2): 304-316. 11 T439.

The most important factor in raising seed yield was the amount of N applied.

0085. BAILEY, L. H. 1922. The Standard Cyclopedia of Horticulture, Vol. 5 (P-R). The Macmillan Co., New York. pp. 2423-3041. 90.9 B1S5.

Description of 20 Papaver species pp. 2455-2460.

0086. BAILLON, H. 1872. Histoire des plantes. Vol. 3. Librairie Hachette et Cie, Paris. 545 pp.

Morphological studies of the Papaveraceae and a description of the genus Papaver are given on pp. 105-143.

0087. BALACHOWSKY, A. 1947. Biology and injury from Ceutorrhynchus macula-alba Herbst., a curculionid harmful to cultures of poppy. (Fr). Entomologiste 3: 208-212. 421 En814.

Life cycle of the weevil and its damage to P. somniferum capsules.

0088. BALACHOWSKY, A. S. 1963. Ceuthorrhynchus injurious to Papaveraceae. (Fr). Entomol. Appl. Agric., I. Coleopteres 2: 1049-1055. 423 B18E.

The description and life cycle of C. macula-alba and Stenocarus fuliginosus and their damage to poppies.

0089. *BALASESCU, N. 1923. Culture of the poppy (P. somniferum). (Rum). Viata Agric. 14: 460-467.

Cultivation of the poppy in Rumania considering the growing conditions of that country.

0090. BALATKOVA, V., and J. TUPY. 1972. The stimulatory effect of uracil and 5-bromouracil on the seed set of Papaver somniferum L. Biol. Pl. (Praha) 14(2): 140-145. 450 B52.

Sucrose solutions of uracil and 5-bromouracil increased seed set 70% when injected into the ovaries 3 hr prior to pollination.

0091. BALBI, G. 1960. Poppy seed oil in the manufacture of paints and varnishes. (Ital). Olearia 14: 97-104. 307.8 012.

A review, including composition figures.

0092. BALDACCI, M. 1947. Experiments on cultivation of opium poppy in Italy by production of seed. (Ital). Olearia 4: 171-175. 307.8 012.

Production figures are given for some European countries for the years 1929-1945 and current production in regions of Italy.

0093. BALLARIN, C. 1950. Studies on *Helminthosporium papaveris* (Ger). Phytopathol. Z. 16(4): 399-442. 464.8 P562.

Taxonomy, morphology and physiology of the fungus.

0094. BALME, J. 1919. Poppy cultivation. (Span). Rev. Agric. (Mexico) 4: 428-429. 8 R321.

Brief cultural directions for *P. somniferum* are given, including methods of harvesting the product and the yields to be expected.

0095. BALOGH, S. 1962. Planting area and yield of *Papaver*. (Hung). Magyar Mezőgazd. 17(8): 9. 19 M27.

Yield in relation to spacing of plants.

0096. BAN'KOVSKI, A. I., and V. I. MURAV'EVA. 1942. A new source of morphine. (Rus). Dokl. Vsesojuzn. Akad. Sel'skohoz. Nauk Lenina 1942(1/2): 33-35. 20 Akl.

Examination of various types of oil poppy showed that morphine was present in dry seed heads left after the removal of seeds.

0097. BARBACKA, K. 1937. *Helminthosporium* on cultivated poppy. (*Helminthosporium papaveri* K. Sawada). (Pol; summ. Eng). Panstwowego Inst. Nauk. Gosp. Wiejskiego W. Pulawach, Pamietnik 16(1): 73-86. (1936). 20.5 P19.

P. rhoeas appears resistant to the disease which attacks seedlings and poppy heads.

0098. BARBIER, A. 1950. The extraction of opium alkaloids. Bull. Narc. 2(3): 22-29. LC: HV5800 B8.

After a description of three classical processes for the extraction of morphine from opium with their drawbacks, a new process is described which is more suitable for industrial use.

0099. BARKER, H. D., and W. S. DARDEAU. 1930. Flore d'Haiti. Port-au-Prince, Haiti. 456 pp. SI: QK228 B25.

Papaveraceae (pp. 122-123) include *P. rhoeas*.

0100. BARKLEY, T. M. 1968. A manual of the flowering plants of Kansas. Manhattan, Kan. 402 pp. SI: QK161 B25.

Papaveraceae (pp. 154-155) include P. rhoeas.

0101. BARNARD, C. and H. FINNEMORE. 1945. Drug plant investigations. I. Progress report. Austral. Counc. Sci. Indust. Res. J. 18(4): 277-285. 514 8Au72J.

Three varieties of P. somniferum were grown at Canberra and the morphine extracted was maximum 19 days after full bloom. The variety English was frost resistant.

0102. BARONA-LOBATO, J. 1964. The coca leaf monopoly and the state monopoly. Annex III. The opium monopoly in India. Gen/Nar/64/Conf.2/2. 9 pp. BNDD: UN HV5810 C.

The efficiency of the Indian opium monopoly is praised. Cultivation is carried out on behalf of the government, the cultivators receive cash advances and must deliver all opium harvested without adulteration. There is detailed field inspection.

0103. BARONA-LOBATO, J. 1964. Some aspects of narcotics control in Mexico. Bull. Narc. 16(3): 1-5. LC: HV5800 B8.

Mexican authorities must destroy the fields of poppy and cannabis and eradicate the drug traffic along the border.

0104. BARONA-LOBATO, J. 1968. Air spotting and destruction of clandestine opium poppy cultivation in Mexico. Bull. Narc. 22(3): 18. LC: HV5800 B8.

Spraying a field with Tordon 101 by helicopter eradicated the plants.

0105. BARTON, D. H. R., D. S. BHAKUNI, G. M. CHAPMAN, and G. W. KIRBY. 1966. The biosynthesis of roemerine, anonaine and mecambrine. Chem. Commun. 1966(9): 259-260. 382 C4223.

P. dubium plants were used.

0106. BARTON, D. H. R., D. S. BHAKUNI, G. M. CHAPMAN, and G. W. KIRBY. 1967. Phenol oxidation and biosynthesis. Part XV. The biosynthesis of roemerine, anonaine, and mecambrine. J. Chem. Soc. (C) 1967(21): 2134-2140. QD241 C5.

The relationship between the alkaloids coclaurine and roemerine in P. dubium were studied.

0107. BARTON, D. H. R., G. W. KIRBY, W. STEGLICH, G. M. THOMAS, A. R. BATTERSBY, T. A. DOBSON, and H. RAMUZ. 1965. Investigations on the biosynthesis of morphine alkaloids. J. Chem. Soc. 1965: 2423-2438. 382 L84J.

Several of the final stages of the biosynthesis of morphine alkaloids are defined.

0108. BARTOSCH. 1929. The poppy in South Serbia. (Ger). Ernahr. Pflanzen 25(7): 149-155. 57.8 Er6.

Opium varies from 8-14% depending on locality and fertilizer.

0109. BASILEVSKAYA, N. A. 1928. On the races of the opium poppy, growing in Semiretchie, and the origin of their culture. (Rus; summ. Eng). Bull. Appl. Bot. Genet. Pl. Breed. 19(2): 95-184, Eng. summ. 170-184. 451 R92.

Flower, leaf, capsule and seed characters were studied for races of *P. somniferum*. Possible ancestors in relation to history of the opium poppy are discussed.

0110. BASILEVSKAYA, N. A. 1931. Principle botanic-systematical groups of the opium poppy, *Papaver somniferum*. (Rus; summ. Eng). Trudy Prikl. Bot. 25(5): 185-196. 451 R92.

P. somniferum is divided into 2 groups: opium poppies and oil poppies. The opium poppies, treated here, are divided into 7 subspecies (geographical cultivated races) on the basis of 5 morphological characteristics.

0111. BASU, H. N., and M. M. CHAKRABARTY. 1960. Studies on the hydrogenation characteristics of some less known oils: teaseed, poppyseed and nigerseed oils. J. Sci. Industr. Res., India, 19B: 227-228. 475 J82.

Hydrogenation tests showed that seed oil from poppy could substitute for groundnut oil as a source of edible and industrial fat.

0112. BASU, H. N., A. K. GAYEN, and M. M. CHAKRABARTY. 1926. Studies on the comparative stabilities of some hydrogenated linoleic-rich oils. Sci. & Cult. 28(6): 283-285. 475 Sci24.

Oils from a number of seeds including poppy are stable on hydrogenation and are economically suitable for use in place of conventional oils.

0113. BATEUVA, T. 1925. The numerical variation of flowers of Roemeria and Papaver. (Rus; summ. Fr). Bjull. Sredne-Aziatsk. Gosud. Univ. 9: 19-40. 511 T18.

At optimum conditions of growth, the number of sepals, petals, stamens and carpels increases per flower in the 5 Papaver spp. studied. The second flower of the plant usually has more stamens than the first.

0114. BATTAGLINI, M., and G. BOSI. 1968. Fatty acids of pollens most intensively collected by Apis ligustica Spin. in the Perugia region. (Ital; summ. Fr and Eng). Apicolt. Ital. 35(2): 37-43. Bee Culture Libr.: 424.8 Ap372.

All pollens collected by Apis mellifica ligustica were rich in unsaturated fatty acids; in P. rhoeas pollen they constituted 91% of the total.

0115. BATTANDIER, J. A., and L. TRABUT. 1888. Flore de l'Algerie. Algeria. 825 pp. SI: 581.965 B33.

There are 7 species of Papaver including P. somniferum (pp. 19-23).

0116. BATTERSBY, A. R. 1966. Biosynthesis of some alkaloids based upon aromatic precursors. pp. 111-118. In G. Billek (ed) Biosynthesis of aromatic compounds. (Fed. Europe Biochem. Soc. Proc. Meet. 2, Vol. 3). Pergamon Press, London and New York. LC: QP521 F4.

In a study of the biosynthesis of alkaloids with aporphine bases, P. orientale converts orientaline to isothebaine but there is no further conversion to thebaine.

0117. BATTERSBY, A. R., R. BINKS, R. J. FRANCIS, D. J. MCCALDIN, and H. RAMUZ. 1964. Alkaloid biosynthesis. Part IV. 1-Benzylisoquinolines as precursors of thebaine, codeine and morphine. J. Chem. Soc. 1964: 3600-3610. 382 L84J.

Labeled norlaudanosoline fed to P. somniferum plants was converted into morphine, codeine and thebaine.

0118. BATTERSBY, A. R., R. BINKS, and B. J. T. HARPER. 1962. Alkaloid biosynthesis. II. The biosynthesis of morphine. J. Chem. Soc. 1962: 3534-3544. 382 L84J.

Labeled tyrosine fed to P. somniferum plants was incorporated into morphine. Phenylalanine is incorporated less efficiently.

0119. BATTERSBY, A. R., T. J. BROCKSOM. and R. RAMAGE. 1969. Further studies on the synthesis and biosynthesis of isothebaine. J. Chem. Soc. (D) 1969(9): 464-465. 382 C4223.

Labeled orientalinols, fed to P. orientale plants, were incorporated into isothebaine.

0120. BATTERSBY, A. R., and T. H. BROWN. 1966. Orientalinone, dihydro-orientalinone and salutaridine from Papaver orientale: related tracer experiments. Chem. Commun. 1966(6): 170-171. 382 C4223.

0121. BATTERSBY, A. R., R. T. BROWN, J. H. CLEMENTS, and G. G. IVERACH. 1965. On the biosynthesis of isothebaine. Chem. Commun. 11: 230-232. 382 C4223.

Labeled orientaline was incorporated by P. orientale plants into isothebaine. There was no significant conversion of isothebaine into thebaine or the reverse.

0122. BATTERSBY, A. R., G. W. EVANS, R. O. MARTIN, M. E. WARRENT, JR., and H. RAPOPORT. 1965. Configuration of reticuline in the opium poppy. Tetrahedron Lett. 18: 1275-1278. 385.T29.

0123. BATTERSBY, A. R., D. M. FOULKES, and R. BINKS. 1965. Alkaloid biosynthesis. Part VIII. Use of optically active precursors for investigations on the biosynthesis of morphine alkaloids. J. Chem. Soc. 1965: 3323-3332. 382 L84J.

Labeled reticuline is incorporated into thebaine, codeine and morphine in plants of the opium poppy. Labeled 1,2-dehydro-reticuline is also incorporated into morphine.

0124. BATTERSBY, A. R., D. M. FOULKES, M. HIRST, G. V. PARRY, and J. STAUNTON. 1968. Alkaloid biosynthesis. Part XI. Studies related to the formation and oxidation of reticuline in morphine biosynthesis. J. Chem. Soc. (C) 1968(2): 210-216. QD241 C5.

Codamine, reticuline, and bis-3,4-dihydroxyphenethylamine are not precursors of morphine in P. somniferum.

0125. BATTERSBY, A. R., and R. J. FRANCIS. 1964. Alkaloid biosynthesis. Part V. Experiments on opium alkaloids using 3,4-dihydroxyphenethylamine. J. Chem. Soc. 1964: 4078-4080. 382 L84J.

The injection of labeled dihydroxyphenethylamine into the capsules of P. somniferum was followed by the isolation of radioactive morphine, codeine and thebaine.

0126. BATTERSBY, A. R., R. J. FRANCIS, H. HIRST, R. SOUTHGATE, and J. STAUNTON. 1967. Stereochemical studies concerning the biosynthesis of narcotine, protopine and chelidonine. Chem. Commun. 1967(12): 602-604. 382 C4223.

P. somniferum plants were used.

0127. BATTERSBY, A. R., and B. J. T. HARPER. 1958. Biogenesis of morphine. Chem. & Ind. Lond. 12: 364. 382 M31C.

Degradation of morphine isolated from *P. somniferum* plants fed labeled tyrosine.

0128. BATTERSBY, A. R., and B. J. T. HARPER. 1962. Alkaloid biosynthesis. I. The biosynthesis of papaverine. J. Chem. Soc. 1962: 3526-3533. 382 L84J.

Labeled tyrosine fed to *P. somniferum* plants was incorporated into papaverine.

0129. BATTERSBY, A. R., and M. HIRST. 1965. Concerning the biosynthesis of narcotine. Tetrahedron Lett. 11: 669-673. 385 T29.

Labeled methionine and reticuline fed to *P. somniferum* plants were incorporated into narcotine.

0130. BATTERSBY, A. R., M. HIRST, D. J. MCCALDIN, R. SOUTHGATE, and J. STAUNTON. 1968. Alkaloid biosynthesis. Part XII. The biosynthesis of narcotine. J. Chem. Soc. (C) 1968(17): 2163-2172. QD241 C5.

P. somniferum plants were fed a variety of precursors.

0131. BATTERSBY, A. R., J. A. MARTIN, and E. BROCHMANN-HANSSEN. 1967. Alkaloid biosynthesis. Part X. Terminal steps in the biosynthesis of the morphine alkaloids. J. Chem. Soc. (C) 1967(19): 1785-1788. QD241 C5.

Codeinone can serve as a precursor of codeine and morphine.

0132. BATTERSBY, A. R., and D. J. MCCALDIN. 1962. Biosynthesis of narcotine. Proc. Chem. Soc. 1962: 365-366. 382 L84P.

Labeled narcotine was isolated from *P. somniferum* plants fed labeled tyrosine.

0133. BAUMGARTEN, G., and W. CHRIST. 1950. The poppy-seed capsule alkaloid narcotoline. (Ger). Pharmazie 5(2): 80-82. LC: RS1 P673.

Chemical comparison of narcotoline and narcotine.

0134. BAYER, I. 1964. Separation of the principal opium alkaloids by thin-layer chromatography. (Ger). J. Chromatogr. 16(1): 237-238. 475 J824.

Alkaloids include morphine, codeine, thebaine, papaverine and narcotine.

0135. BAZILEVSKAYA, N. A. 1934. Bibliography and abstracts on opium. (Rus). Trudy Prikl. Bot. 13(2): 1-86. 451 R92R.

A bibliography of more than 1,200 articles dealing with all aspects of poppy and opium. Selected papers are abstracted.

0136. BEADLE, N. C. W., O. D. EVANS, and R. C. CAROLIN. 1962. Handbook of the vascular plants of the Sidney District and Blue Mountains. Armidale, Australia. 597 pp. SI: QK445 B36.

The Papaveraceae are given on pp. 137-138 and include _P_. _aculeatum_, _P_. _somniferum_ and _P_. _hybridum_.

0137. BEAN, J. E. 1969. Guide on market quality of hay and chaff. Queensland Agric. J. 95(4): 221-226. 23 Q33.

Papaver spp. are common contaminants of hay and chaff in Australia and are prohibited under the Agricultural Standards Acts, 1952 to 1963.

0138. BEAUMONT, A. 1953. Diseases of poppies, Gard. Chron. Ser. III, 134: 71. 80 G162.

Diseases with their control for the common cultivated poppy.

0139. BECHYNE, M. 1965. The effect of spacing on the biological and production properties of poppies (_Papaver_ _somniferum_ L.). (Czech; summ. Rus, Eng and Ger). Rostl. Vyroba 11(12): 1289-1300. 64.9 C33.

The total yield of poppy heads and seeds was highest in the smallest applied spacing, 15 x 10 cm.

0140. *BECHYNE, M. 1966. The effect of cultivation treatments on biological and economic characteristics of poppy. (Czech). Sborn. Vysoke Skoly Zemed. Praze 1965-1966: 353-367.

Cross-thinning of poppy crops gave as good results as hand singling and a higher yield than traditional cultivation methods, which leave too few plants/ha.

0141. BECHYNE, M. 1966. The culture of poppies on a large scale. (Czech). Za Vysokou Urodu 14(9): 333-334. 64.8 Z12.

0142. BEGLARYAN, N. P. 1969. Effectiveness of presowing treatment of seeds with gibberellic acid. (Rus; summ. Armen). Biol. Zhurn. Arm. 22(11): 64-73. 20 Er9.

Seeds of the 1st to 5th generation of *P. rhoeas* were treated before sowing with 0.01-0.1% solution of gibberellic acid. Greatest changes, increasing with generation, were in the 0.01% in which the 5th generation surpassed the controls by 25 days in budding, 21 days in flowering and considerable increase in height, number of flowers/ plant and size of flower and leaf.

0143. BEGUINOT, A. 1926. Researches on hybrids in several races of *Papaver*. (Ital). Atti Soc. Naturalisti Modena 4: 1-18. 507 M72A.

In the cross *P. somniferum album* x *P. somniferum nigrum*, the flower and seed coat color is dominant. In *P. rhoeas album* x *P. rhoeas* the F_1 shows individuals with white marginate petals indicating hybrid influence that never occurs with *P. somniferum*. In the F_2 of both there is a smaller number of perfect albinos than expected.

0144. BEHR, L. 1956. Downy mildew of poppy (*Peronospora arborescens* (Berk.) de Bary). Studies in the biology of the causal organism. (Ger). Phytopathol. Z. 27: 289-334. 464.8 P562. Abridged version in Kün- Arch. 70: 540-541. 105.8 H15Ku.

The fungus is found wherever poppy is cultivated. Heavy infestations result from cool rainy weather at seed germination and attacked plants form few, if any, capsules.

0145. BEISHEMBIEV, D. B., and M. P. PODSEVALOV. 1966. Mechanized cultivation of opium poppy in Kirghizia. (Rus). Frunze, Kyrgyzstan. 61 pp. SB295 06B4.

Large scale machinery.

0146. BEL'TIUKOVA, K. I., and O. P. LEBEDEVA. 1935. On the specialization of *Phytomonas tabaca* Wolf & Foster on certain host plants. (Rus). Krasnodar Vsesoiuzn. Nauch. Issled. Inst. Tabach. Bull. 126: 17-34. 69.9 K86.

The fungus is pathogenic to opium poppy following inoculation.

0147. BENADA, J. 1967. Redox potential gradients in the flower. Biol. Pl. 9(3): 202-204. 450 B52.

The ovary of P. somniferum has a lower redox potential than the petals.

0148. BENADA, J., J. SEDIVY, and J. SPACEK. 1966. Atlas der Krankheiten und Schädlings der Ölpflanzen. (Atlas of diseases and pests of oil plants). (Text in Ger, Rus and Czech). Landwirtschaftlicher Staatsverlag Prag in zusammenarbeit mit veb Deutscher Landwirtschaftsverlag, Berlin, 2nd Ed. 206 pp. Folio Sb608 035A8.

In this folio volume there are descriptions and full page color plates of 17 diseases and 12 insect predators of P. somniferum.

0149. BENAIGES DE ARIS, C. 1925. Opium experiments in Spain. Int. Rev. Sci. Pract. Agric. 111(2): 540-543. 241 In82A.

Cultivation of the poppy in Spain including sowing methods, soil and harvest of opium.

0150. *BENCZE, B., M. FUSCHL, and E. C. NAGY. 1949. Poppy ripening processes. (Hung). Magyar Kem. Lapja 4: 711-713. 385 M27.

Discussion of the processes involved in the ripening of poppy pods.

0151. BENCZE, B., and B. J. HALMY. 1948. The poppy. (Hung). Magyar Kem. Lapja 3: 570-576. 385 M27.

Poppy capsules grown in various parts of Hungary contained 0.256-0.735% morphine. Selections were made for high morphine content.

0152. BENNETT, C. W. 1960. Sugar beet yellows disease in the United States. U.S.D.A., Techn. Bull. 1218: 1-63. 1AG 84TE.

P. somniferum susceptible to beet yellow virus upon inoculation.

0153. BERBEC, S. 1967. Yields of poppy and carrot in conjoint cultures, correlated with the spacing of plants. (Pol; summ. Rus and Eng). Ann. Univ. Mariae Curie-Sklodowska, Sect. E, Agr. 22(16): 233-246. 512 L96AE.

Poppy decreased the yield of fodder carrot more than carrot the yield of poppy.

0154. *BERGER, F. 1948. Opium. Benediction of medicine, curse of passion. (Ger). Universum 3(4): 61-62, 5 figs.

Notes on history, production and harvesting of opium in Turkey, Macedonia, Mesopotamia, China, India, Yugoslavia and Persia.

0155. BERGER, H. 1946. An experiment in obtaining raw opium as a by-product of the poppy crops of the Gross-Rosenberger Feldmark July 8-9, 1946. (Ger). Pharmazie 1: 319. LC: RS1 P673.

The process described yielded an opium equal in morphine content to opiums of foreign (to Germany) production.

0156. BERGER, H. 1950. Raw opium harvested during 1949 in Saxony. (Ger). Pharmazie 5(5): 239-241. LC: RS1 P673.

An account of agronomic methods including manpower and harvesting of raw opium in West Germany.

0157. BERGMARK, M. 1953. The poppy - a symbol of life and death. (Swed). Tradgardstidningen 25(6): 14-15, 18. 80 T67.

General article on the history and use of opium.

0158. BERGSTRÖM, I. 1942. A preliminary disinfection test with oil poppy seed. (Swed). Växtskyddsnotiser 2: 28-29. 464.9 Sw3V.

Dipping the seeds in 1.5-3% aqueous solutions of the usual disinfectants could prevent seedling infection caused by *Pleospora calvescens*.

0159. BERGSTRÖM, I. 1942. Boron deficiency in oil poppies. (Swed). Växtskyddsnotiser 4: 54-57. 464.9 Sw3V.

Application of 10-15 kg borax per hectare in spring, mixed with other fertilizers, is recommended as a remedy. During the growing season an aqueous solution of borax (1-1.5 g per square meter) can be applied to the area that shows a deficiency.

0160. BERKELEY, M. J. 1846. Observations, botanical and physiological on the potato murrain. J. Hort. Soc. London. 1: 9-34. 84 L84J.

Botrytis arborescens on *P. rhoeas*. (p. 31).

0161. BERKELEY, M. J. 1857. Note on the development of fungi upon Patna opium. J. Proc. Linn. Soc. Bot. 1: 143-144. 451 L64J.

Specimens of the shell of opium cakes, consisting of the petals of *P. somniferum* agglutinated with impure opium waste were infected with *Aspergillus* and *Penicillium*.

0162. BERKES-TOMASEVIC, P., and L. MATVEJEVA. 1959. Chromatographic determination of morphine in biological materials. (Serb; summ. Eng). Godishev. Zbornik Med. Fak. Skopje 5(2): 25-30. MAM: W1 Sk665.

A simple and fast method for determination of morphine in urine, bile and extracts of kidney, liver and brain, using paper chromatography.

0163. BERLESE, A. N. 1904. Section of a monograph on Peronosporaceae. (Ital). Riv. Patol. Veg. 10: 185-298. 464.8 R52.

Peronospora arborescens attacks all aerial parts of adult and seedling plants of Papaver somniferum, P. rhoeas, P. argemone and P. dubium in Italy. Flowers are distorted and capsules often sterile.

0164. BERNATH, J., and D. VAGUJFALVI. 1970. Effect of CCC and DMSO on poppy. (Hung; summ. Rus, Ger and Eng). Herba Hung. 9(3): 49-60. 71.8 H413.

Plants treated with CCC showed increased resistance to unfavorable weather conditions prevailing at the time of ripening. DMSO by itself had no effect on plants. Both substances had little effect on total alkaloid content but influenced the proportion of the individual components.

0165. BERNHARDI, J. J. 1833. On the character and relationship of Papaveraceae and Fumariaceae. (Ger). Linnaea 8: 401-477. 450 L642.

Comparison of the characters with a description of the genera of both families.

0166. BERNHARDI, J. J. 1838. Supplementary observations on the Papaveraceae and Fumariaceae. (Ger). Linnaea 12: 651-668. 450 L642.

Relationships of the various genera in the families are discussed.

0167. BERSILLON, G. 1951. On the vegetative bud of Papaver somniferum L.: Structure and function. (Fr). Compt. Rend. Hebd. Seances Acad. Sci. 232: 2470-2472. 505 P21.

Morphological development of the vegetative bud.

0168. BERSILLON, G. 1955. On the formation of the flower bud in Papaver somniferum L. (Fr). Compt. Rend. Hebd. Seances Acad. Sci. 240: 903-905. 505 P21.

Morphological study of the formation of the floral bud.

0169. BERSILLON, G. 1955. Investigations on Papaveraceae. Contribution to the study of development of herbaceous dicotyledons. (Fr). Ann. Sci. Nat. Bot. XI. 16: 225-447. 450 An75.

A general coverage of phyllotaxy, histology, differentiation of conductive tissue and floral morphology with considerable detail on *P. somniferum*.

0170. BERTSCH, K. 1941. Fruchte und Samen. *In* H. Reinerth (ed.) Handbucher der praktischen Vorgeschichtsforschung 1: 1-247. 402.1 B461F.

Seed coat drawings of *P. rhoeas*, *P. dubium*, *P. argemone* and *P. somniferum*. (pp. 166-167).

0171. BESEMER, A. F. H., and M. OOSTENBRINK. 1955. Phytotoxic and nematicidal residual effects of soil sterilization with DD. (Dutch). Ghent Landbouwhogeschool Mededel. 20(3): 282-283. 105.1 G344.

Soil treatment with DD at 60 cm^3/m^2 is effective against *Pratylenchus penetrans*, meadow nematode on *P. somniferum*, in the Netherlands.

0172. BETTSCHART, A., and H. FLÜCK. 1956. Partition chromatography of alkaloids, especially of opium alkaloids, in buffered systems. (Ger; summ. Fr, Ital and Eng). Pharm. Acta Helv. 31: 260-283. MAM.

Alkaloids studied were morphine, thebaine, narceine, codeine, papaverine and narcotine.

0173. BHOWN, A. S., D. K. SHAH, and S. NATH. 1965. Studies on poppy seed (*Papaver somniferum*). Part I: Free amino acids. Naturwissenschaften 52(18): 516-517. 474 N213.

Almost all the essential amino acids except tryptophan are present in the free state in poppy seeds, thus enhancing their nutritional value.

0174. BICK, I. R. C. 1964. The structure of fugapavine. (Summ. Ger). Experientia 20(7): 362-363. 475 Ex7.

0175. BIDGOOD, J. 1904. Albinism with special reference to Shirley poppy. J. Roy. Hort. Soc. 28: 477-482. 84 L84J.

Hybridization in the garden resulted in an albino form of *P. rhoeas* which breeds true.

0176. BILLS, C. E., and D. I. MACHT. 1924. A quantitative photozoocidal comparison of some opium alkaloids. J. Pharm. Exp. Therap. 23: 261-268. 396.8 J82.

Thebaine, pantopium and papaverine are 30X more toxic for Paramecium than morphine or codeine. There is some evidence that paramecia exposed to slightly toxic doses of opium alkaloids become adapted to these doses.

0177. BINIECKI, S., and L. RYLSKI. 1956. Isolation of narcotine, thebaine and codeine in the extraction of morphine by the method of Kabay. (Fr). Ann. Pharm. Fr. 14: 208-211. 396.8 An7.

Chemical method of isolation.

0178. *BITTERA, M. 1921. Contribution to the cultivation and selection of poppy. Kiserl. Közlem. 24: 1-16. 105.9 H89.

0179. BLAGOJEVIC, Z. and M. SKRIJ. 1970. Separation by thin-layer chromatography and spectrophotometric determination of some opium alkaloids in pharmaceutical preparations. (Czech; summ. Fr). Arhiv Farma. 20(2-3): 109-114. MAM.

Micro-quantities of morphine, codeine, papaverine and narcotine can be determined.

0180. BLARINGHEM, L. 1920. Metamorphosis of the stamens into carpels in the genus Papaver. (Fr). Compt. Rend. Hebd. Seances Mem. Soc. Biol. 83: 1521-1523. 442.9 P21.

Tardy shoots of P. bracteatum give small abnormal flowers in which the stamens are changed into carpels.

0181. BLARINGHEM, L. 1925. A sterile hybrid of field poppy (Papaver somniferum L. var. nigrum DC.) and a wild poppy (Papaver setigerum DC.). (Fr). Bull. Soc. Bot. France 72: 623-628. 451 F84B.

The hybrid has all the paternal characters dwarfed. The plants are knotty, the number of stamens is much reduced, the stamens are open and the pollen aborted and the number of stigmatic bands ranges from 3-6.

0182. BLARINGHEM, L. 1926. A perennial, fertile, poppy hybrid, Papaver lateritio-bracteatum. (Fr). Bull. Soc. Bot. France 73: 451 F84B.

Hybrid of P. bracteatum X P. lateritium resembles the mother parent in hardiness, size of flower and the ovary, while the leaves and anthers are intermediate between parents.

0183. BLARINGHEM, L. 1930. Influence of pollen on the movements which precede the opening of poppy flowers. (Fr). Compt. Rend. Hebd. Seances Acad. Sci. 191: 177-181. 505 P21.

Movements of the peduncle in *P. setigerum*, P. *somniferum* and a hybrid between the two species were studied in the presence and absence of the anthers.

0184. BLARINGHEM, L. 1932. A case of atavism appearing in an opium poppy line. (Fr). Compt. Rend. Hebd. Seances Acad. Sci. 195(25): 1192-1195. 505 P21.

An aberrant poppy having red-bordered, instead of pure white petals appeared in a line of *P. somniferum* var. *mursellii* which had been selfed 7 generations. The mutant proved dominant and was described as atavism.

0185. BLARINGHEM, L., and R. TRANNOY. 1928. Biological control of the influence of nitrogen and limestone on the development of the opium poppy. (Fr). Compt. Rend. Acad. Agric. Franc. 1928: 41-43. 14 P215BC.

The addition of N to *P. somniferum* plants in pots increases the number of stigmas in the flower.

0186. BLASCHKE, G. 1969. Biosynthesis of morphine alkaloids. (Ger). Mitt. Deut. Pharm. Ges. DDR. 39(10): 225-234. MAM.

A review.

0187. BLASCHKE, G., H. I. PARKER, and H. RAPOPORT. 1967. Codeinone as the intermediate in the biosynthetic conversion of thebaine to codeine. J. Amer. Chem. Soc. 89(6): 1540-1541. 381 Am33J.

P. somniferum plants were used.

0188. BLAZSEK, A. 1959. Identification of opium alkaloids by paper chromatography. (Rum; summ. Rus, Fr). Rev. Med. (Tirgu-Mures, Romania), 5: 434-438. C22 062.

Methods for obtaining by paper chromatography and the values for morphine, thebaine, codeine, narceine, narcotine, and papaverine are given for tinctura opii, extractum opii and tinctura papaveris.

0189. BLOCKMAN, G. E. 1948. The future of oil seed crops. Farming 2: 205-207. 10 F2226.

Dwarf poppies that ripen in the south of England with late spring sowing, produce more oil/ha than linseed or sunflowers. On the other hand, seed is minute, shallow sowing is difficult and germination slow.

0190. BOCHER, W., K. HOLMEN, and K. JAKOBSEN. 1968. Grønlands flora. P. Haase & Sons, Copenhaven. 312 pp. SI: QK474 B66.

P. radicatum and P. nudicaule on pp. 83-84.

0191. BODEN, H. 1953. Cultivation of poppy without time consuming hand labor. (Ger). Landwirtschaft 3/4: 47-49. 19 L235.

Mechanized cultivation of poppy is cheaper than hand cultivation.

0192. BOGARADA, A. P. 1967. Results of the use of hexachlorocyclohexane and polychloropinene against poppy curculio. (Rus). Khim. Sel'skom. Khoz. 5(6): 424-426. 385 K524.

Beetles and larvae of Stenocarus fuliginosus were controlled by treating the poppy seedlings with 5% DDT dust or 12% hexachloran dust. Almost complete control of the larvae was obtained by application to the soil of 2-3 kg/ha hexachloran dust together with seeds and superphosphate.

0193. BOGARADA, A. P. 1967. Ceuthorrhynchus denticulatus Schrank--a new poppy pest in Ukraine. (Rus; summ. Eng). Zool. Zhurn. 46(5): 777-778. 410 R92.

The weevil damaged poppy sprouts in the Ukraine.

0194. BOGDASHEVSKAYA, O. V. 1958. Biosynthesis of morphine in poppy (Papaver somniferum) and its movement in the plant. (Rus). Fiziol. Rast. 5: 185-187. 450 F58.

Lysine fed to poppy plants caused increase of the alkaloid content in buds and roots but not leaves, while glycine and glutamic acid reduced it.

0195. BOGNAR, R., and D. GAAL. 1960. Nitro derivatives of morphine and codeine. (Ger; summ. Rus). Izv. Khim. Inst. Bulgar. Akad. Nauk. 7: 399-411. LC: QD1 B832.

0196. BOGNAR, R., G. GAAL, P. GORECKI, and P. KEREKES. 1969. Isolation of the main alkaloids of Papaver somniferum. (Hung; summ. Rus and Ger). Herba Hung. 8(1-2): 195-198. 71.8 H413.

The Kobay process of morphine production from threshed poppy capsules results in a side product containing codeine, thebaine, narcotine, narcotiline and papaverine. Methods for separating the alkaloids are given.

0197. BOGNAR, R., G. GAAL, P. GORECKI, and S. SZABO. 1967. Alkaloids associated with morphine. II. Isolation of narcotoline and papaverine. (Ger). Pharmazie 22(9): 525-526. LC: RS1 P673.

0198. BOGNAR, R., G. GAAL, P. KEREKES, and S. SZABO. 1967. Alkaloids associated with morphine. I. Isolation of codeine, thebaine and narcotine. (Ger). Pharmazie 22(8): 452-455. LC: RS1 P673.

Isolation from poppy straw.

0199. BÖHM, H. 1965. On *Papaver bracteatum* Lindl. II. The alkaloids of ripe hybrids from the reciprocal crossing of this species with *Papaver somniferum* L. (Ger; summ. Eng). Pl. Med. 13(2): 234-240. 450 P697.

F_1 hybrids contain the alkaloids of both parents, thebaine and morphine.

0200. BÖHM, H. 1966. Biochemical-genetical problems of breeding medicinal poppies. (Ger; summ. Hung). Herba Hung. 5(2-3): 123-126. 71.8 H413.

Report from East Germany on attempts to develop poppies with a high alkaloid content as medicinal raw material, with special reference to crosses between *P. somniferum* and *P. bracteatum*.

0201. BÖHM, H. 1966. Characterization of alkaloid spectra of northern poppies. (Ger). Abh. Deut. Akad. Wiss. Berlin, Kl. Chem. 1966(3): 325-328. 509 D482.

Chromatographic studies of the alkaloids of *P. radicatum* and *P. lapponicum*.

0202. BÖHM, H. 1967. *Papaver bracteatum* Lindl. III. Characteristic change of the alkaloid spectrum during plant development. (Ger; summ. Eng). Pl. Med. 15(2): 215-220. 450 P697.

P. bracteatum comprises several alkaloidal strains. Seedlings of the thebaine-strain contain 6-8 alkaloids, most of which disappear completely during plant development and only thebaine remains in the mature plant. In the E-strain, alkaloid E which is present in seedlings is also, with thebaine, present in the mature plant.

0203. BÖHM, H. 1970. Results and possibilities of work on a medicinal poppy. (Ger; summ. Eng). Pl. Med. 19(2): 93-109. 450 P697.

A morphine-rich unbranched strain of P. somniferum suitable for mechanical harvesting is described. The possibilities of P. orientale for oripavine and P. bracteatum for thebaine is discussed.

0204. BÖHM, H. 1971. On Papaver bracteatum Lindl. VIII. A new occurrence of alpinigenine in thebaine-types after feeding of tetrahydropalmatine. (Ger; summ. Eng). Biochem. Physiol. Pflanzen (BPP) 162(5): 474-477. QK710 F5.

P. bracteatum plants contain alpinigenine during early stages of development but none in older plants. With the addition of THP to older leaves, alpinigenine is again synthesized.

0205. BÖHM, H., P. MÜLLER. and H. R. SCHÜTTE. 1966. Biochemistry of latex. XI. Accumulation of N-acetylornithine in the latex of Papaver bracteatum Lindl. (Ger). Flora (Jena) 156(4): 445-450. QK710 F5.

The compound was found in the latex and as traces in the foliage in plants that were several years old. There was no trace in the seed.

0206. BÖHM, H., and D. NEUBAUER. 1966. Remarks on alkaloid synthesis in the isolated latex of Papaver somniferum L. (Ger). Abh. Deut. Akad. Wiss. Berlin, Kl. Chem. 1966(3): 345-346. 509 D482.

Poppy latex samples showed no incorporation of labeled tyrosine.

0207. BÖHM, H., B. OLESCH, and C. SCHULZE. 1972. Biochemistry and physiology of latex. 20. Further investigations on the biosynthesis of alkaloids in isolated latex from opium poppy, Papaver somniferum L. (Ger; summ. Eng). Biochem. Physiol. Pflanz. (BPP) 163(2): 126-236. QK710 F5.

Isolated latex can synthesize morphine from labeled tyrosine. The maximum radioactivity was incorporated in latex from the bud stage and decreased as the plant matured. In electron microscopy studies, isolated latex from young plants is more structured, particularly in the number of cellular particles which decrease during ontogenesis.

0208. BÖHM, H., and H. RÖNSCH. 1968. *Papaver bracteatum*. V. Biosynthesis of alkaloids of the rhoeadine type. (Ger). Z. Naturforsch. 23(11): 1552-1553. 474 Z3.

Blooming plants metabolized labeled tyrosine to alpinigenine.

0209. BÖHME, ___. 1948. Poppy yields valuable edible oil. (Ger). Landfrau 3(1/10): 17. 18 L2337.

Yield of oil from poppy compared to other oil-seeds.

0210. BÖHME, H., and W. HÜHNERMANN. 1965. Determination of morphine in opium. (Ger). Arch. Pharm. 298: 533-547. 396.8 Ar2A.

Variation in percentage morphine in opium from different areas.

0211. BOISSIER, E. 1867. Flora orientalis, Vol. I. H. George, Basil. 1017 pp. 460 B63F.

Species of *Papaver* are described on pp. 105-118.

0212. BOIT, H. G., and H. EHMKE. 1958. Alkaloids of *Papaver paeoniflorum*. (Ger). Naturwissenschaften 45: 315. 474 N213.

Codeine, thebaine, narcotine, papaverine.

0213. BOIT, H. G., and H. FLENTJE. 1960. Nudaurine, muramine and amurensine, three new *Papaver* alkaloids. (Ger). Naturwissenschaften 47: 180. 474 N213.

All three from varieties of *P. nudicaule*.

0214. BONDARTSEVA, A. S. 1903. Fungus parasites of cultivated and wild plants collected in the vicinity of Riga during the summer of 1902. (Rus; summ. Ger). Izv. Imp. S.-Peterburgsk Bot. Sada 3: 177-200. 451 Sa2B.

Peronospora arborescens on *Papaver somniferum* in USSR. (p. 188).

0215. BONDARTSEVA, A. S. 1906. Plant parasites of cultivated and wild plants collected in the Kursk district in the summers of 1901, 1903-1905. (Rus). Trudy Imp. S.-Peterburgsk Bot. Sada 26: 3-52. 451 Sa2A.

Peronospora arborescens collected on *Papaver somniferum*. (p. 25).

0216. BONTEA, V. 1953. Ciuperci parazite si saprofite din Republica populara Romana. (Parsitic and saprophytic fungi of Rumania). 637 pp. Bucuresti. QK603 B6.

Entyloma fuscum, *Erysiphe communis* and *Peronospora arborescens* were found on *Papaver somniferum*. (pp. 175-176).

0217. BORKOWSKI, B., B. DROZDZ, and W. JANISZEWSKI. 1964. Components of the neutral fraction of poppy straw. (Pol; summ. Rus and Eng). Diss. Pharm. 16(3): 311-316. MAM: PO 257J.

Straw has little value as a source of tetracyclic triterpene alcohols.

0218. BOROS, A. 1927. Concerning *Papaver hungaricum* Borb. (Hung). Bot. Kozlem. 24(5/6): 212. 450 N85.

P. hungaricum is the hybrid *P. dubium* x *P. strigosum* var. *lamprophyllum*, not *P. dubium* x *P. rhoeas* var. *calvellum*.

0219. BÖSENBERG, K. 1970. Bird damage to poppy and possibilities of its reduction. Nachrichtenbl. Deutsch. Pflanzen-Schutzdienst 24: 38-40. LC: 464.9 N11.

Linnets, carrion crows, starlings and other birds damage poppy capsules and may be deterred by acoustical devices.

0220. BOSER, F. 1945. Über die Morphinbestimmung im Mohnstoh. (On morphine determination in poppy straw). Zurich. 104 pp. 463.29 B65.

Discussion of a new method for isolating morphine from poppy capsules and straw and comparison with other published methods.

0221. BOSHART, K. 1934. The diseases and pests of the principal drug and spice plants. (Ger). Nachr. über Schädlingsbekampf. 9(2): 57-82. 464.8 N112.

Peronospora arborescens reduces opium production 50-60% in Yugoslavia. *Ceuthorrhynchus macula-alba* lays eggs in unripe poppy capsules and the larvae feed upon developing seeds. Larvae of cockchafers feed upon the roots. (p. 59).

0222. BOSMA, W. A. 1951. Results of varietal tests of grains, peas and blue poppy seed in 1950. (Dutch). Netherlands Dir. Vieringermeer. Verslag 13: 3-23 (1950). 290.9 N382.

Yields of varieties.

0223. BOYD, O. C. 1948. Diseases and weather in Massachusetts. Pl. Dis. Reporter 32(8): 348-349. 1.9 P69P.

Bacterial blight damaged oriental poppies.

0224. BRADFORD, L. W., and J. W. BRACKETT. 1958. Systematic procedure for the identification of dangerous drugs, poisons, and narcotics by ultraviolet spectrophotometry. Mikrochim. Acta 1958(3): 353-382. J84 M58.

Data for 166 organic compounds from 25 vegetables, including opium.

0225. BRANDENBURG, E. 1942. Boron deficiency in poppy. (Ger). Z. Pflanzenkrankh. 52(2/4): 56-63. 464.8 Z3.

In severe cases of boron deficiency development ceases at an early stage. In less severe cases, flowers and capsules are deformed, ovules and seed tend to decay.

0226. BRAUN, O. 1949. The oil poppy. (Span). Campo (La Paz) 3(27): 11-13. 9.1 C15.

The possibility of poppy as a potential source of vegetable oil in Bolivia is discussed. Cultural requirements are given.

0227. BREDEMANN, G. 1939. Contribution to the culture of poppy (_Papaver_ _somniferum_ L.) for higher alkaloid content. (Ger). Compt. Rend. VI Congr. Inter. Techn. Chim. Ind. Agr. Budapest 2: 378-386. LC: S583 C6.

A brief history of the culture of opium poppy and methods for obtaining morphine, since 1750, and discussion of methods for increasing the alkaloid content.

0228. BREDEMANN, G. 1941. The breeding of locust-resistant plants. (Ger). Z. Pflanzenkrankh. 51(8): 337-342. 464.8 Z3.

In the Near East leaves of _P_. _somniferum_ are never attacked by locusts.

0229. BREKHMANN, I. I., A. F. GAMMERMAN, I. V. GRUSHVITSKIĬ, and A. A. YATSENKO-KHELEVKIĬ. 1967. The drugs of plant origin in Vietnam and the contribution of Professor Do tat Loi to their investigations. (Rus). Rast. Resur. 3(1): 114-217. 450 R18.

This general article states that most of the drugs used in Vietnam are locally produced, only a few are imported from China. They are interested in medicinals, including *P. somniferum*, cultivated in other countries.

0230. BREKKE, O. L., G. C. MUSTAKAS, J. E. HUBBARD, H. G. MAISTER, L. VAN ERMEN, M. C. RAETHER, and C. T. LANGFORD. 1958. Morphine extraction from domestically grown opium poppy. J. Agric. Food Chem. 6(12): 927-929. 381 J8223.

A commercial process was developed to recover crude morphine liquor from the straw of mature *P. somniferum* plants grown in the United States. The straw keeps in dry storage without morphine loss.

0231. BREKKE, O. L., G. C. MUSTAKAS, M. C. RAETHER, H. G. MAISTER, and C. T. LANGFORD. 1960. Process to recover morphine from poppy straw. U.S. Agricultural Research Service, Northern Utilization Research and Development Division, Peoria, Ill. 194 pp. A309 N81P.

Method for large-scale extraction.

0232. BREMER, H., and E. GÄUMANN. 1945. A contribution to the knowledge of Asia Minor species of *Peronospora*. (Ger). Schweiz. Bot. Ges., Ber. 55: 151-153. 451 Sch9.

Peronospora arborescens collected on *Papaver somniferum* in Ankara, Turkey.

0233. BREMER, H., H. ISMEN, G. KAREL, H. ÖZKAN, and M. ÖZKAN. 1947. Contribution to the knowledge of parasitic fungi of Turkey. II. (Ger). Rev. Fac. Sci., Univ. Istanbul B 12(4): 307-334. 475 Is7.

Entyloma fuscum is found on *P. somniferum* and *P. commutatum* in Turkey and the Orient. (p. 329).

0234. BRENCHLEY, W. E. and K. WARINGTON. 1945. The influence of periodic fallowing on the prevalence of viable weed seeds in arable soil. Ann. Appl. Biol. 32(4): 285-296. 442.8 An72.

Once *P. rhoeas* is reduced by fallow it fails to reestablish itself.

0235. BRESADOLA, G. 1891. Fungi of Hungary, collected in 1886-1898 by Professor V. Greschik. (Fr). Rev. Mycol. 13: 20-33. 450 An74.

Phoma melaena, blight on Papaver somniferum in Hungary. (p. 26).

0236. BRESADOLA, G. 1915. New fungi from Saxony. (Ger). Ann. Mycol. 13: 104-106. 450 An76.

Macrosporium papaveris described as a new species on P. somniferum in Germany.

0237. BRIARD, ____. 1891. New fungi. III. (Fr). Rev. Mycol. (Toulouse) 13: 15-18. 450 R329.

Description of Alternaria brassicae (Berk.?) Sacc. var. somniferum Briard & Hariot collected on capsules of P. somniferum.

0238. BRIDGES, R. F., M. M. CHAKRABARTY, and T. P. HILDITCH. 1951. The composition of poppy seed oils. J. Oil Colour Chem. 34: 354-360. 306.9 Oi5.

Linoleic acid formed 72-73% of the total fatty acids.

0239. BRIQUET, J. 1913. Prodrome de la flore Corse. II(1). Geneve. 409 pp. SI: 581.94595.

The Papaveraceae are given on pp. 1-20 and include P. somniferum, P. rhoeas, P. pinnatifidum, P. dubium, P. argemone and P. hybridum.

0240. BRITON-JONES, H. R. 1925. Mycological work in Egypt during the period 1920-1922. Min. Agric., Egypt, Techn. Sci. Serv. Bull. 49: 1-129. 24 Eg93.

Peronospora arborescens, downy mildew is found on P. somniferum in Egypt. (p. 119).

0241. BRITTLEBANK, C. C. 1919. The Iceland poppy disease. J. Dept. Agric. Victoria 17: 700. 23 V66J.

Occurrence of Phytophthora on poppy in Australia.

0242. BRITTON, N. L. 1918. Flora of Bermuda. Hafner Publishing Co., New York. 585 pp. SI: QK232 B86.

Papaveraceae (pp. 142-144) include P. somniferum and P. rhoeas.

0243. BROCHMANN-HANSSEN, E. 1966. New opium alkaloids and their biosynthesis. Medd. Norsk Farm. Selsk. 28(10/11): 186-196.

Reticuline, salutaridine, scoulerine, corytuberine and isoboldine are discussed in relation to biosynthetic pathways. Two routes by which thebaine may be transformed to codeine in the opium poppy are mentioned.

0244. BROCHMANN-HANSSEN, E. 1971. Aspects of chemistry and biosynthesis of opium alkaloids. pp. 347-369. *In* H. Wagner and L. Hörhammer, Pharmacognosy and Phytochemistry. Springer-Verlag, New York.

The structures and biosynthetic pathways of some of the opium alkaloids.

0245. BROCHMANN-HANSSEN, E., C.-C. FU, A. Y. LEUNG, and G. ZANATI. 1971. Opium alkaloids. X. Biosynthesis of 1-benzylisoquinolines. J. Pharm. Sci. 60(11): 1672-1676. 396.8 J825.

Labeled norreticuline was incorporated into papaverine in *P. somniferum*.

0246. BROCHMANN-HANSSEN, E., C.-C. FU, and L. Y. MISCONI. 1971. Opium alkaloids XI: Biosynthesis of aporphines in *Papaver somniferum*. J. Pharm. Sci. 60(12): 1880-1883. 396.8 J825.

Labeled reticuline was incorporated into isoboldine.

0247. BROCHMANN-HANSSEN, E., C.-C. FU, and G. ZANATI. 1971. Opium alkaloids. IX. Detection of coreximine in *Papaver somniferum* L. based on its biosynthesis from reticuline. J. Pharm. Sci. 60(6): 873-878. 396.8 J825.

Coreximine is a normal member of the opium alkaloids in poppy.

0248. BROCHMANN-HANSSEN, E., and T. FURUYA. 1964. New opium alkaloid. J. Pharm. Sci. 53(4): 575. 396.8 J825.

Reticuline was isolated from crude opium.

0249. BROCHMANN-HANSSEN, E., and T. FURUYA. 1964. Opium alkaloids--separation and identification by gas, thin-layer and paper chromatography. J. Pharm. Sci. 53: 1549-1550. 396.8 J825.

The gas method separated the largest number of alkaloids; the thin layer method was less reproducible. Paper chromatography showed considerable selectivity when the other 2 methods were unsatisfactory.

0250. BROCHMANN-HANSSEN, E., and T. FURUYA. 1964. A new opium alkaloid. Isolation and characterization of (±)-1-(3-hydroxy-4 methoxybenzyl)-2-methyl-6-methoxy-7-hydroxy-1,2.3.4-tetrahydroisoquinoline [(±)-reticuline]. Pl. Med. 12: 328-333. 450 P697.

Significance as a biogenetic precursor for opium alkaloids is discussed.

0251. BROCHMANN-HANSSEN, E., and K. HIRAI. 1967. Opium alkaloids. V. Structure of porphyroxine. J. Pharm. Sci. 56(1): 1658-1660. 396.8 J825.

A monophenolic alkaloid isolated from opium.

0252. BROCHMANN-HANSSEN, E., and K. HIRAI. 1968. Opium alkaloids. VII. Isolation of a new benzylisoquinoline alkaloid. Synthesis and NMR studies of papaveroline trimethyl ethers. J. Pharm. Sci. 57: 940-943. 396.8 J825.

A new phenolic alkaloid, named palaudine, was isolated from opium.

0253. BROCHMANN-HANSSEN, E., K. HIRAI, B. NIELSEN, S. PFEIFER, I. MANN, and L. KÜHN. 1968. Opium alkaloids. VI. Isolation of N-methyl-14-0-desmethylepiporphyroxine. J. Pharm. Sci. 57: 30-35. 396.8 J825.

Isolation and characterization studies.

0254. BROCHMANN-HANSSEN, E., A. Y. LEUNG, K. HIRAI, and G. ZANATI. 1970. Opium alkaloids. VIII. Isolation of salutaridine and 13-oxycryptopine. Pl. Med. 18(2): 366-371. 450 P697.

Chemical characterizations of the alkaloids and their roles as intermediates in the biosynthesis of opium alkaloids are discussed.

0255. BROCHMANN-HANSSEN, E., and B. NIELSEN. 1965. (+)-Reticuline--a new opium alkaloid. Tetrahedron Lett. 18: 1271-1274. 385 T29.

Reticuline is one of the 6 or 7 principal alkaloids of opium.

0256. BROCHMANN-HANSSEN, E., and B. NIELSEN. 1965. 6-Methylcodeine--a new opium alkaloid. J. Pharm. Sci. 54(9): 1393. 396.8 J825.

Isolated during the extraction of morphine.

0257. BROCHMANN-HANSSEN, E., and B. NIELSEN. 1966. Opium alkaloids. III. Isolation of alpha-allocryptopine. J. Pharm. Sci. 55: 743-744. 396.8 J825.

0258. BROCHMANN-HANSSEN, E. and B. NIELSEN. 1966. The isolation of (-)-scoulerine from opium. Tetrahedron Lett. 1966(20): 2261-2263. 385 T29.

0259. BROCHMANN-HANSSEN, E., B. NIELSEN, and G. AADAHL. 1967. Biosynthetic conversion of thebaine to codeine and role of codeine methyl ether. J. Pharm. Sci. 56(1): 1207-1208. 396.8 J825.

Codeine methyl ether is not an opium alkaloid but rather a byproduct of morphine purification.

0260. BROCHMANN-HANSSEN, E., B. NIELSEN, and K. HIRAI. 1967. Opium alkaloids. IV. Isolation of isoboldine. J. Pharm. Sci. 56(1): 754-756. 396.8 J825.

Isolation and identification of this aporphine alkaloid from opium and possible biosynthetic pathways are discussed.

0261. BROCHMANN-HANSSEN, E., B. NIELSEN, and G. E. UTZINGER. 1965. Opium alkaloids. II. Isolation and characterization of codamine. J. Pharm. Sci. 54: 1531-1532. 396.8 J825.

Physical and chemical properties of codamine isolated from opium.

0262. BROCHMANN-HANSSEN, E., and A. B. SVENDSEN. 1963. Quantitative determination of morphine in opium by gas-liquid chromatography. J. Pharm. Sci. 52: 1134-1136. 396.8 J825.

0263. BROOK. S. D. 1957. Additions to the smut fungi of New Zealand. II. Trans. Roy. Soc. New Zealand 84: 643-648. 514 W46.

Entyloma fuscum collected on P. somniferum.

0264. BROSSI, A., and S. TEITEL. 1970. Selective O-demethylation of papaverine. J. Org. Chem. 35(5): 1684-1687. 381 J827.

0265. BROUWER, W., and A. STÄHLIN. 1955. Handbuch der Samenkunde fur Landwirtschaft, Gartenbau und Forstwirtschaft. DLG-Verlags-GMBH., Frankfurt Am Main. 655 pp. 61 B79H.

Describes seeds of 42 papaveraceous species from 15 genera including 12 Papaver spp. (Papaveraceae: pp. 393-399).

0266. BROWN, I., and M. MARTIN-SMITH. 1960. Oxidation products from codeine. J. Chem. Soc. 1960: 4139-4140. 382 L84J.

0267. BROWNE, F. 1896. The composition of opiums from several provinces of China. (Fr). J. Pharm. & Chim. Ser 6, 4: 31-32. 383 J825.

A comparison of the percentages of individual alkaloids in opium from the provinces of Kwei-Chou, Yunnan and Szechuen showed considerable variation.

0268. BRUGGINK, H. A. 1949. Threshing of blue poppy. (Dutch). Plattelands-Post 5(40): 7. 12 P69.

Threshing machines were tried for separating the seeds. The straw was recycled through several sieves to remove all the seeds before morphine extraction.

0269. BRUNDZA, K. 1935. Contribution to the knowledge of Lithuanian Erysiphaceae. (Lith; summ. Ger). Dotnava, Lithuania, Zemes Ukio Akad. 9(2): 83-99.

Erysiphe cichoracearum was found on P. argemone, P. rhoeas and P. somniferum; E. communis on P. somniferum.

0270. BRUNDZA, K. 1937. Report of the Phytopathological Section of the Plant Protection Station in Lithuania for the year 1935. (Lith; summ. Eng). Zemes Ukio Tyrino Istaiges Darbai 14: 1-28. 106 D742.

Erysiphe polygoni and Entyloma fuscum reported on P. somniferum in Lithuania.

0271. BRYAN, M. K., and F. P. MCWHORTER. 1930. Bacterial blight of poppy caused by Bacterium papavericola sp. nov. J. Agric. Res. 40: 1-10. 1 AG84J.

A bacterial spot disease of P. rhoeas and P. orientale occurring in Virginia and Connecticut is described.

0272. BÜCHI, J., R. HUBER, and H. SCHUMACHER. 1960. Application of paper chromatography to the investigation of opium and opium alkaloids. Bull. Narc. 12(2): 25-45. LC: HV5800 B8.

Samples of opium from four different countries were analyzed by various published methods and compared for morphine.

0273. BÜCHI, J., and R. VON MOOS. 1967. Separation of opium alkaloids by use of ion exchangers. (Ger). Pharm. Acta Helv. 41: 142-163. 396.8 P4933.

Method is described.

0274. BUCHOLTZ, F. 1909. 4. Catalogue of the Peronosporales of the eastern provinces of Russia according to the literature and collections made by the author. (Ger). Korrespondenzbl. Naturf.-Vereins Riga 52: 161-172. 511 R44K.

Peronospora arborescens on Papaver argemone, P. dubium and cultivated P. somniferum.

0275. BUCUR, M. 1960. Determination of morphine in poppy capsules by a shaking method. (Rum; summ. Rus, Fr, Eng and Ger). Farmacia (Bucharest) 8: 447-452. Sheppard Libr., Mass. Col. Pharm.

Method can be applied to as little as 1 g of material and has an error of 3%.

0276. BUHR, H. 1955-1956. On the knowledge of the Peronosporaceae of Mecklenburg. (Ger). Arch. Freunde Naturgesch. Mecklenburg 2: 109-243. 474 Ar2.

Peronospora arborescens is reported on P. somniferum and seven other Papaver spp.

0277. BUKZEEV, N. 1960. Growing the opium poppy. (Rus). Sel'sk. Khoz. Kirgizii 1960(3): 33-39. 20 Se493.

Fertilizer applications and their relation to yield.

0278. BULAT, H. 1963. Stages in the loss of viability within the seed tissues and the decline in germination of seed subjected to unfavourable storage conditions, as demonstrated by the Topographical Tetrazolium method. (Ger; summ. Eng and Fr). Proc. Int. Seed Test. Assoc. 28: 713-751. 61.9 In84P.

Seeds of 41 species, including Papaver, were stored for about 3 years at various temperatures combined with increasing humidity. Most species were more sensitive to humidity than temperature with damage occurring between 55-73%.

0279. BULLIS, C. R. 1955. Golden green blotches in oriental poppies. Bull. Amer. Iris Soc. 137: 9-11. 81 Am39.

General discussion of the inheritence of petal color and blotches in the development of a new variety.

0280. BULNES, B. 1926. Narcotic drugs in Mexico. pp. 113-117. In H. S. Middlemiss, Narcotic education. Washington, D.C. BNDD.

Control of poppy cultivation and opium importation in Mexico.

0281. *BUNGER, H. 1943. Poppy residues as forage for milking cattle. (Ger). Forschungsdienst 15: 171.

Extracted poppy seed has a high protein content, is eaten willingly by the cattle and results in good milk production.

0282. BÜNNING, E. 1952. The daily rhythm of frequency of mitosis in plants. (Ger). Z. Bot. 40(2): 193-199. 450 Z32.

In a study of several species including *P. somniferum*, the maximum frequency of mitosis is reached at about the same time of day in both long- and short-day plants.

0283. BUNSEN, C. L. F. 1820. De opio. Erlangae. 26 pp. MAM.

Extraction, effects on humans, and medicinal uses of opium.

0284. BUNTING, E. S. 1948. Oil seed crops in Great Britain. Ann. Appl. Biol. 35: 132-133. 442 An72.

Experimental plantings of oil poppy varieties Peragis and Mahndorfer yielded 49% oil.

0285. BUNTING, E. S. 1963. Changes in the capsule of *Papaver somniferum* between flowering and maturity. Ann. Appl. Biol. 51(3): 459-471. 442.8 An72.

Changes in dry weight of seed and capsule, morphine, oil and protein were studied from flowering to seed ripening in different varieties for the years 1948-1960.

0286. BURBIDGE, N. T., and M. GRAY. 1970. Flora of the Australian Capitol Territory. Australian National University Press, Canberra. 447 pp. SI: QK445 B94.

Papaveraceae (pp. 176-178) include *P. aculeatum*, *P. hybridum*, *P. dubium*, *P. rhoeas* and *P. setigerum*.

0287. BURG, J. P. L. L. A. 1953. Herb growing in Yugoslavia. (Dutch; summ. Eng). Mededel. Directeur Tuinbouw 16(10): 867-877. 86 N384.

Most herbs exported by Yugoslavia are collected from wild plants. Only a few, including *P. somniferum*, are cultivated.

0288. BURGVITS, G. K. 1935. Phytopathogenic bacteria. (Rus). Publications Office Academy Science, USSR, Leningrad. 252 pp. 464.2 B91.

Bacterium papaveris is reported on *P. somniferum* in India and *Bacterium papaverum*, in Bulgaria.

0289. BURK, G. 1948. Poppy between turnips. (Ger). Württemberg. Wochenbl. Landw. 115: 64-65. 18 W96.

Cultivation of two crops together uses the land efficiently.

0290. BURKILL, I. H. 1909. A working list of the flowering plants of Baluchistan. Calcutta. 136 pp. SI: 581.9588 B95.

Papaveraceae (p. 5) include *P. somniferum*, *P. dubium*, *P. pavoninum* and *P. decaisnei*.

0291. BURMA, D. P. 1954. Paper ionophoresis of alkaloids. Naturwissenschaften 41(1): 19. 474 N213.

Used to separate alkaloids of *Cinchona*, opium and *Strychnos*.

0292. BURTON, R. W. 1946. The oriental poppy. A spectacular flower. Mich. Gardener 12(7): 11-12. 80 H7815.

Popular article on cultivation with recommended varieties.

0293. BUTCHER, R. W. 1960. A new illustrated British flora. 1: 243-248. Leonard Hill, Ltd. London. LC: 581.942 B983.

Descriptions and illustrations of *Papaver argemone*, *P. dubium*, *P. hybridum*, *P. lecoqii*, *P. rhoeas*, and *P. somniferum*.

0294. BUTLER, E. J. 1917. Botany. Part III. Mycology. Ann. Rept. India Sci. Advice Board 1915-1916: 103-113. 330.9 In2.

Peronospora arborescens is a normal parasite present in almost every poppy field in India and epidemic only under favorable climatic conditions. Root rot caused by Rhizoctonia is dependent on cultivation conditions such as defective drainage.

0295. BUTLER, E. J. 1918. Fungi and diseases in plants. Thacker, Spink & Co., Calcutta and Simla. 547 pp. 464.1 B97.

Peronospora arborescens and Rhizoctonia sp. on the opium poppy in India. (pp. 344-346).

0296. BUTLER, E. J., and G. R. BISBY. 1931. The fungi of India. India Imper. Council Agric. Res., Sci. Monogr. 1: 1-237. 22 In7S.

Erysiphe polygoni and Peronospora arborescens reported on Papaver somniferum.

0297. BUTLER, E. J., and G. R. BISBY. (Rev. by R. S. Vasudeva). 1960. The fungi of India. The Indian Council of Agricultural Research, New Delhi, 552 pp. 462 B97.

The fungi found on P. somniferum are: Erysiphe cichoracearum, E. polgoni, Peronospora arborescens, Pellicularia filamentosa and Sclerotium rolfsii. On P. rhoeas is found Oidium erysiphoides and a Papaver sp. had Entyloma fuscum. (pp. 228).

0298. BZDZIUCH, S. 1960. Timaspis papaveris Kieff. (Hym., Cynipidae) a new injurious insect of poppy seed in Poland. (Pol). Poiskie Pismo Ent. Ser. B. Ent. Stosowana 3-4(19-20): 273-274. 421 P762.

0299. CABINET COMMITTEE ON INTERNATIONAL NARCOTICS CONTROL. 1972. World opium survey 1972. 48 pp., Appendix 63 pp.

The world opium market is discussed including, illicit opium processing, the 3 main illicit trading networks, illicit market prices and the control efforts. The appendix contains maps of opium growing areas of the major producing countries with a survey of production and consumption. (Turkey, Afghanistan, Iran, Pakistan, India, Burma, Laos, Thailand, China, Germany, France, Italy, Canada, Mexico, Bulgaria, Yugoslavia, USSR, Argentina, Ecuador, Peru, Panama).

0300. CABO TORRES, J., P. ARTIGAS GIMENEZ, M. P. PADRO GARCIA, M. PANADERO VIDAL, and J. NOSTI NAVA. 1957. Standardization of some methods of analysis of medicinal plants. (Span). Farmacognosia (Madrid) 17(44): 225-252. 396.8 F222.

Includes the determination of morphine in poppy capsules.

0301. CABRERA, A. L. 1967. Flora de la Provincia de Buenos Aires. Parte III. Piperaceas a Leguminosas. Coleccion Cientifica Del I.N.T.A., Buenos Aires. 671 pp. SI: QK261 C11.

Papaveraceae (pp. 265-273) include _P_. _rhoeas_ and _P_. _dubium_.

0302. CAKAR, L. 1960. A contribution to the knowledge of _Stenocarus fuliginosus_ Marsh. (Serb; summ. Eng). Zast Bilja. 1960(57/58): 183-202. 464.8 Z1.

A detailed description is given of the biology of this pest and the damage it causes to oil-seed poppies in Macedonia.

0303. CARLSON, E. T., and M. M. SIMPSON. 1963. Opium as a tranquilizer. Amer. J. Psychiat. 120(2): 112-117. MAM.

Opium use in psychiatry peaked in the middle of the 19th century, but it was increasingly considered a cause of mental illness and finally a psychiatric disease itself.

0304. CASHAW, J. L., M. J. WALSH, Y. YAMANAKA, and V. E. DAVIS. 1971. Simultaneous determination of biogenic amines and narcotic alkaloids by gas-liquid chromatography. J. Chromatogr. Sci. 9(2): 98-104. 381 J8225.

Morphine, normorphine, codeine and tetrahydropapaveroline were completely separated from each other.

0305. CASSELS, B. K., and V. DEULOFEU. 1966. Resolution of o-benzoyl-(±)-codamine L(+) and D(-)-codamine. Tetrahedron Suppl. 8(2): 485-490. 382 T29.

0306. CASTEL, J., and M.-F. VIALLEFONT. 1966. Analysis of an old sample of thebaine. (Fr). Trav. Soc. Pharm. Montpellier 26(2): 127-134.

Analysis of a sample dated 1900 showed no deterioration.

0307. CASTIGLIA, E. 1955. On histological polyploidy in plants: Observations on Scilla obtusifolia Poir. (Ital; summ. Eng). Caryologia 7(3): 420-437. 442.8 C25.

Mitotic activity was stimulated in differentiated tissue of some Papaver species and in Scilla obtusifolia with 2,4-D. In poppy the presence of polyploidy was noted but it was not localized.

0308. CAVARA, C. 1949. The opium poppy. (Ital). Piante Officinali 4(4): 12-27. 71.8 P57.

A general review including uses, varieties, cultivation and production figures for the world and Italy.

0309. *CAVARA, F., and A. CHISTONI. 1923. The cultivation of Papaver somniferum L. in R. Orto Botanico di Napoli. (Ital). Atti del Congr. Naz. per le Industr. Sanit. Napoli.

0310. *CAVARA, F., and A. CHISTONI. 1924. New results in the cultivation of the opium poppy at the R. Orto Botanico di Napoli. (Ital). Atti del R. 1st di Incoraggiamento di Napoli, Ser. VI, 76.

Cultivation of P. somniferum at Naples.

0311. CAVARA, F., and A. CHISTONI. 1926. Hybridization and morphine content in Papaver somniferum L. (Ital). Atti Reale Accad. Naz. Lincei, Rendiconti Cl. Sci. Fis. 3(6): 113-118. 507 R66.

Hybrids between blue- and white-seeded varieties of poppy can have higher, better-quality morphine yields.

0312. CEDELL, T. 1972. Resumption of the Swedish poppy. (Swed). Svensk Frotidn. 40(4): 51-53. 61.8 Sv2.

Cultivation of the poppy including spacing, fertilizers, chemical weed control, etc.

0313. CHALMERS, R. A., and G. A. WADDS. 1970. Spectrofluorimetric analysis of mixtures of the principal opium alkaloids. Analyst 95(1128): 234-241. 382 An1.

Method for the detection and determination of morphine, codeine, narcotine and papaverine.

0314. *CHANTARASRIKUL, A. 1968. A supplementary host list of plant diseases in Thailand. Thailand Dept. Agr., Tech. Bull. 9: 1-14.

Peronospora sp. occurs on Papaver somniferum in Thailand.

0315. CHASOVNIKOVA, K. A. 1937. Variability of the qualitative composition of the alkaloids in the subspecies of Papaver somniferum. (Russ; summ. Eng). Biokhimiya 2: 701-704. 385 B523.

All investigated subspecies contained morphine, thebaine, codeine and narceine in varying quantities. However, the Chinese variety differed in that no trace of papaverine or narcotine was found.

0316. CHATTOPADHYAY, S. B. 1967. Diseases of plants yielding drugs, dyes and spices. Indian Council of Agricultural Research, New Delhi. 100 pp. SB605 14C4.

Peronospora arborescens, Macrophomina phaseoli, Bacterium papaveris and Erysiphe polygoni occur on P. somniferum and some other Papaver spp. in India.

0317. CHENG, P. C. 1972. Cultivation and analysis of Papaver bracteatum Lindley. Thesis, Univ. Miss. 60 pp.

Ten different types of P. bracteatum obtained from 9 European countries and Iran include several chemical genotypes which vary in their content of thebaine, orientalidine and isothebaine.

0318. CHEVALLIER, A. 1853. Historical account on native opium. (Fr). Moniteur des Hopitaux 1: 230-233. MAM.

Tracing the history of cultivating opium poppy in France beginning in the early 18th century.

0319. CHISTONI, A. 1931. Oil and alkaloid content of seeds of Papaver somniferum. (Ital). Arch. Farm. Sper. Sci. Affini 52(2): 29-32. 396.8 Ar22.

P. somniferum var. album can produce the same percentage of oil in Italy as in the Orient, and lancing the capsule does not affect the oil content of the seed. The seeds can be toxic to mice.

0320. CHOPRA, I. C., B. K. ABROL, and K. L. HANDA. 1960. Medicinal plants of the arid zones. I. With particular reference to the botanical aspects. pp. 11-53. *In* UNESCO, Arid Zone Research 13. Oberthur, Rennes, France. 278.9 UN3.

In summarizing various aspects of medicinal plants, *P. somniferum* is discussed on pp. 43-44 with notes on cultivation, distribution, composition of opium and its narcotic and analgesic action.

0321. CHOPRA, R. N., and N. N. GHOSE. 1931. Addiction to 'Post'--unlanced capsules of *Papaver somniferum*. II. Composition of lanced and unlanced capsules. Indian J. Med. Res. 19(2): 415-421. LC: R97 I55.

The percent of morphine in the poppy capsules is far less than that in opium, while the percentages of narcotine and codeine are equal or higher.

0322. CHOPRA, R. N., K. S. GREWAL, J. S. CHOWHAN, and G. S. CHOPRA. 1930. Addiction to 'Post' (unlanced capsules of *Papaver somniferum*) in India. Indian J. Med. Res. 17(4): 985-1007. LC: R97 I55.

Unlanced capsules contain much less morphine but more codeine, narcotine and papaverine than opium. The differences between addiction to 'Post' which is taken as a beverage and addiction to opium is discussed.

0323. CHORIN, M., and J. PALTI. 1962. Erysiphaceae in Israel. Israel J. Agric. Res. 12: 153-166. 107 J552.

Erysiphe polygoni on *P. somniferum*. (p. 156).

0324. CHRISTOFF, AL. 1943. Fungi causing spots on bolls and molding of seed in opium poppy. (Bulg; summ. Eng). Spisanie Zemedielskitie Opitni Inst. (Zeitschr. Landw. Versuchsta Bulgarien) 13(1/2): 13-19.

Spotting of bolls and seed infection are usually caused by *Peronsopora arborescens*, *Pleospora calvescens*, *Alternaria brassicae* var. *somniferum*, *Fusarium scirpi* var. *caudatum*, *Mycosphaerella tulasnei* and *Ophiobolus sativus*. Control measures are given.

0325. CHUPP, C. 1954. A monograph of the fungus genus *Cercospora*. Ithaca, N.Y. 667 pp. 462.82 C47.

Cercospora papaveri is common on *P. somniferum* in Formosa. (p. 430). *Cercospora papavericola* is reported as a nov. comb. on *P. somniferum* in Brazil; also from Alabama, Florida and Texas. (pp. 430-431).

0326. CIFERRI, R. 1928. Fourth contribution to the study of Ustilaginales. (Ital). Ann. Mycol. 26: 1-68. 450 An76.

Entyloma fuscum on P. somniferum in Italy. (p. 18-19).

0327. CLAPHAM, A. R., T. G. TUTIN, and E. F. WARBURG. 1962. Flora of the British Isles. Cambridge. 1269 pp. SI: 581.942 C588.

There are 8 species of Papaver including P. lateritium and P. somniferum in the Papaveraceae on pp. 94-102.

0328. CLAUTRIAU, G. 1889. Localization of alkaloids in poppy. (Fr). J. Pharm. Chim. 20: 161-162. 383 J825.

Stage of plant development when morphine and thebaine appears.

0329. CLEIJ, G. 1961. Beet yellows in poppy. (Summ. Dutch). Euphytica 10(2): 225-228. 450 Eu6.

P. somniferum is susceptible to beet yellow virus, which has reduced seed yields by 22%. The use of systemic insecticides to control its vector, Myzus perisicae is recommended.

0330. COATS, A. M. 1968. Flowers and their histories. Pitman Publishing Corp., New York. 346 pp. 90.51 C63.

Brief discussion of the introduction and utilization of Papaver spp. including P. somniferum, P. nudicaule, P. orientale, P. bracteatum and P. rhoeas. Emphasis is on horticultural aspects. (pp. 195-198).

0331. COCKER, H. R. 1945. The opium poppy. Gard. Chron. 118: 64. 80 G162.

P. somniferum was introduced into France during the German occupation as a source of edible oil which had previously been imported.

0332. COIC, Y., C. LESAINT, J. L. PAPIN, and M. LELANDAIS. 1968. Organic acids and mineral substances in the organs of the opium poppy (Papaver somniferum). Their appearance in the reproductive parts during seed development. (Fr; summ. Eng). Ann. Physiol. Veg. 10(1): 29-40. 451 F8432.

The amounts of organic acids, potassium, sodium, calcium, magnesium and nitrogen were analyzed in various parts of the plant, during flower and seed development.

0333. COICIU, E., L. MLESNITA, A. SPEFANESCU, and E. RACZ-KOTILLA. 1959. Comparative culture of opium poppy lines and varieties. (Rum; summ. Fr and Rus). Anal. Inst. Cerc. Agron. Romine, Ser. C 27: 163-172. 451 R86.

Yields of seeds and morphine contents of 1 Polish and 3 Russian varieties were compared with those of 3 local strains. Magurele (local) had the highest yields.

0334. COLLURA, A. M. 1951-1952. The blue poppy. (Span). Alman. Minist. Agric. 26-27: 147-148. 9 Ag874.

Discussion of *P. somniferum* var. *nigra* and its cultivation in Argentina.

0335. COLMEIRO, D. M. 1885. Enumeracion y revision de las plantas de la peninsula Hispano-Lusitana e Islas Baleares. I. Madrid. 595 pp. SI: 581.946 C71.

Papaveraceae (pp. 95-110) includes 9 species of *Papaver* including *P. somniferum*.

0336. COMMISSION INTERNATIONALE DES INDUSTRIES AGRICOLES. 1954. Bibliography on morphology and histology of certain varieties of poppies (*Papaver*). (Fr). Comm. Internat. des Indus. Agr. Bibliogr. B-2570: 1-6. 241 C733.

0337. COMMONWEALTH SCIENTIFIC AND INDUSTRIAL RESEARCH ORGANIZATION, AUSTRALIA. 1947. Twentieth Annual Report for the year ending 30 June, 1946. 127 pp. 514 Au72.

Of the 44 varieties of *P. somniferum* tested, none combined all desirable characters.

0338. COMMONWEALTH SCIENTIFIC AND INDUSTRIAL RESEARCH ORGANIZATION, AUSTRALIA. 1950. Second Annual Report for the year ending 30 June, 1950. 157 pp. 514 Au72.

New hybrids in *P. somniferum* yield 50% more morphine/ha. than the variety grown commercially during World War II.

0339. CORAZZA, M. 1939. Analytical studies on opium cultivated in Italy. (Ital). Arch. Farmacol. Sperim. Sci. Affini 67(1): 18-21. 396.8 Ar22.

Opium from poppies cultivated in Tuscany gave 7 and 8.2% morphine in 2 successive years.

0340. CORRELL, D. S., and M. C. JOHNSTON. 1970. Manual of the vascular plants of Texas. Texas Research Foundation, Renner, Texas. 1881 pp. SI: QK188 C82.

Papaveraceae (pp. 662-667) include _P. somniferum_ and _P. rhoeas_.

0341. COSTE, H. 1937. Flore descriptive et illustree de la France. I. Paris. 416 pp. SI: 581.944 C83.

Papaveraceae (pp. 58-64) include 8 species of _Papaver_ including _P. somniferum_.

0342. COTTINGHAM, J. 1942. The oil poppy. Gard. Chron. 111: 80. 80 G162.

Poppy cultivation for seed in an English garden.

0343. COTTON, A. D. 1929. A fungus disease of _Meconopsis_. Gard. Chron. 85: 143-144. 80 G162.

Peronospora arborescens attacks _Papaver somniferum_, _P. dubium_ and _P. argemone_ in England, Ireland and Scotland.

0344. COUNCIL OF SCIENTIFIC AND INDUSTRIAL RESEARCH. 1966. The wealth of India, raw materials. Vol. 7. New Delhi. 330 pp.

Poppy species are described on pp. 231-248 and include medicinal properties of _P. argemone_, _P. dubium_, _P. nudicaule_, _P. orientale_, _P. rhoeas_ and _P. somniferum_. The opium poppy is discussed in detail; cultivation, opium harvest, storage and processing, addiction and poppy seed use.

0345. COUTINHO, A. X. P. 1939. Flora de Portugal. 2nd Ed. Lisboa. 938 pp. SI: 581.9469 P43.

Papaveraceae (pp. 289-296) include _P. somniferum_, _P. hybridum_, _P. argemone_, _P. rhoeas_ and _P. dubium_.

0346. COZZANI, C., and A. M. SISTO. 1963. Weed control in a poplar nursery. Comparison between aminotriazole (ATA)-simazine and delapon-simazine mixtures. (Ital; summ. Eng). Notiz. Mal. Piante 67: 33-41. Brown Univ. Libr.

ATA-simazine gave satisfactory control of _Papaver_.

0347. CRAIB, W. G. 1925. Florae Siamensis enumeratio. A list of the plants known from Siam with records of their occurrence. Vol. I. Siam Society, Bangkok. 809 pp. SI: QK364 C88.

P. somniferum on p. 75.

0348. CRANE, F. A., and J. W. FAIRBAIRN. 1970. Alkaloids in the germinating seedling of poppy. Trans. Illinois State Acad. Sci. 63(11): 86-92. 500 IL6.

Seedlings of the commercial "blue" strain of P. somniferum showed, by the 3rd day, traces of morphine, codeine, thebaine, papaverine and narcotine. On the 5th day there were traces of reticuline and on the 6th narcotoline.

0349. CREEKMORE, H. 1966. Poppy--Papaver somniferum, pp. 119-129. In H. Creekmore, Daffodils are dangerous, the poisonous plants in your garden. Walker & Co., New York. SB617 C7.

A chapter in the book treats the poppy and its derivatives as portrayed in historical times in literature.

0350. CROSIER, W. F., and C. E. HEIT. 1964. Seed-borne fungi of anchusa, China aster, poppy and zinnia. Proc. Assoc. Off. Seed Anal. 54: 87-92. 61.9 As7.

Helminthosporium papaveris, Dendryphium pencillatum, Alternaria tenuis, Fusarium scirpi and Phoma rhoeadis are found on seeds of various species of Papaver.

0351. CROSS, A. D., I. MANN, and S. PFEIFER. 1966. Alkaloids of the genus Papaver. XII. Stereochemistry of glaudine, oreodine and oreogenine. (Ger). Pharmazie 21(3): 181. LC: RS1 P673.

Glaudine was isolated from P. glaucum and oreodine and oreogenine from P. oreophilum.

0352. CRUCHET, D. 1923. Mycological studies of Montagny and the environs of Yverdon. (Fr). Bull. Soc. Vaud. Sci. Nat. 55: 155-177. 508 L37.

Pleospora papaveracea and Pyrenophora pellita on Papaver somniferum and P. rhoeas in Switzerland.

0353. CULLEN, J. 1965. Papaver L., pp. 219-236. In P. H. Davis, Flora of Turkey and the east Aegean Islands. Vol. 1. Edinburgh University Press, Edinburgh. QK332 D3.

Taxonomic treatment of 36 species occurring in Turkey with keys and illustrations of capsules of some species.

0354. CULLEN, J. 1966. Papaver L., p. 10-22. In K. H. Rechinger. Flora Iranica. Lfg. 34. 27 pp. 460.17 F66.

Thirty species of Papaver treated for Iran.

0355. CULLEN, J. 1968. The genus Papaver in cultivation. I. The wild species. Baileya 16(3): 73-91. 80 B15.

Keys and descriptions of 25 species in cultivation.

0356. CUPKA, S., M. PETRASOVA, and J. CARACH. 1966. Sr^{90} and Cs^{137} content in agricultural products of western Slovakia, 1963-1964. At. Energ. (USSR) 21(3): 846-849.

The amount of isotopes in poppy was relatively low compared to grain crops.

0357. CURRAN, M. K. 1888. Botanical notes. Proc. Calif. Acad. Sci. II 1: 227-269. 500 C12P.

A discussion of the Papaveraceae of the Pacific coast.

0358. CURTIS, A. E. 1945. How to keep oriental poppies happy. Fl. Grower 32: 353. 80 M72.

Garden cultivation with emphasis on division.

0359. CURTIS, A. E. 1945. Papaver orientale; twenty years of breeding. Natl. Hort. Mag. 24: 128-132. 80 N216.

General discussion of breeding for good garden varieties plus culture practices.

0360. CURTIS, A. E. 1947. Add color to your garden with oriental poppies. Fl. Grower 34: 546, 580-581. 80 M72.

List of varieties according to color.

0361. CURTIS, A. E. 1947. Points to remember when planting oriental poppies. Fl. Grower 34: 624. 80 M72.

0362. CURTIS, A. E. 1948. Oriental poppies for enjoyment in the garden and in the home. Fl. Grower 35: 596, 598, 628. 80 M72.

Ornamental varieties for cutting and for the garden.

0363. CURTIS, A. E. 1950. The oriental poppy. Pl. & Gard. 6: 89-92. 450 P694.

Method of making cuttings.

0364. CURTIS, A. E. 1954. Oriental poppies (Papaver orientale). How to use them, how to grow them. Pop. Gard. (Albany) 5(8): 24, 56-59. 80 P812.

Cultivation with varieties listed according to color.

0365. CZABAJSKI, T., and L. GOLCZ. 1962. Influence of fertilizers on yields and on content of morphine in Papaver somniferum L. (Pol; summ. Rus and Eng). Biul. Inst. Roslin Leczn. 8(3): 134-140. 451 P87.

Complete chemical fertilizer results in the highest yield with N and P most important. Rainfall is necessary during rapid growth but it is not needed during maturation.

0366. CZYZEWSKA, S., and H. ZARZYCKA. 1961. Some data on the biology of the fungus Helminthosporium papaveris Henn., perfect stage of Pleospora papaveracea (Wint.) de Not. (Pol; summ. Eng). Acta Agrobot. 10: 41-51. 450 Ac89.

Helminthosporium papaveris isolated from poppy seeds is not a uniform species but composed of several races.

0367. DALEV, D., and L. ILIEV. 1959. Studies in Bulgarian opium. VII. Isolation of morphine from the dry capsules of Papaver somniferum by absorption. (Bulg; summ. Rus and Eng). Nauch. Trudove Visshiya Med. Inst. Sofia 6(7): 29-40. MAM.

Comparison of different synthetic resin absorption columns for the separation of morphine.

0368. DALGADO, D. G. 1898. Flora de Goa e Savantvadi. Lisboa. 290 pp. SI: 581.954 D14.

Papaveraceae (pp. 5-6) include P. somniferum.

0369. DANEL'YANTS, V. A., S. KH. MUSHINSKAYA, and YU. V. SHOSTENKO. 1967. The utilization of paper chromatography for controlling the production of alkaloids from the capsules of oil poppy. IV. A study of the effect of changes in the composition of the mobile phase on the separation of opium alkaloids. (Rus). Khim.-Farm. Zh. 1(2): 49-53. LC: KS402 K46.

Method of alkaloid separation.

0370. DANERT, S. 1958. The taxonomy of Papaver somniferum L. (Ger). Kulturpflanze 6: 61-88. 459 K95.

Describes 52 varieties divided into 4 convarieties.

0371. DANILOVIC, M., and N. RISTIC. 1962. Separation of opium alkaloids by paper chromatography. (Serb). Arh. Farm. 12(2): 112-114. LC: RS1 A69.

0372. DANOS, B. 1964. Chromatographic study of the alkaloids of Papaver somniferum L. (Hung; summ. Rus, Eng and Ger). Acta Pharm. Hung. 34: 221-228. LC: RS1 M33.

Outline of a method for the separation of 12 alkaloids.

0373. DANOS, B. 1965. Effects of generative hybridization on the pattern of alkaloid content of the opium poppy. I. Investigation of the first filial generation (F_1). (Ger). Pharmazie 20(11): 727-730. LC: RS1 P673.

Hybrids differed in morphological characters and alkaloid spectrum. Heterosis was observed in an increase in the contents of morphine and secondary alkaloids.

0374. DANOS, B. 1966. Genetic study of fertile poppy hybrids (F_1 - F_2) with special consideration of the types of alkaloids. (Ger). Abh. Deutsch. Akad. Wiss. Berlin, Kl. Chem. 1966(3): 363-367. 509 D482.

F_1 hybrids have a greater morphine content and greater capsule weight than the parents but the secondary alkaloids are intermediate. In the F_2 generation, less colored plants had more morphine and less secondary alkaloids than dark colored plants.

0375. DANOS, B. 1968. Investigation of the alkaloid spectrum of Papaver somniferum L. by thin-layer chromatography. II. (Hung; summ. Rus and Ger). Herba Hung. 7(1): 27-35. 71.8 H413.

Method described for the separation of 18 alkaloids.

0376. DANOS, B., E. ALBEROWSKY, and S. SARKANY. 1962. Seed and capsule yield and morphine production of poppy in various regions of Hungary. (Hung; summ. Ger). Bot. Kozlem. 49(3/4): 201-208. 450 N85.

Maps of Hungary showing regional production for 1956-1960.

0377. DANOS, B., and S. SARKANY. 1961. Novel results of the poppy hybrid experiments directed to increasing morphine production. (Hung; summ. Rus and Ger). Acta Pharm. Hung. 31/B: 148-159. LC: RS1 M33.

Threshed capsules of 3 new lines of P. somniferum contained 25-30% more morphine than local varieties. After several generations of breeding, certain cultivars were selected for pharmaceutical use.

0378. DARLINGTON, C. D., and A. P. WYLIE. 1955. Chromosome Atlas, 2nd ed. George Allen & Unwin, Ltd., London, 519 pp. 463.6 D24C.

Chromosome numbers are given for 17 genera and 57 species of Papaveraceae (pp. 33-35) including 26 species of *Papaver*.

0379. DARPOUX, H. 1945. A contribution to the study of the diseases of oleaginous plants in France. (Fr). Ann. Epiphyt. n.s. 11(1/2): 70-103. 464.9 F94A.

Helminthosporium papaveris attacks poppy plants and its perfect form *Pleospora papaveracea* is formed on the stems and capsules after winter. *Peronospora arborescens* and *Erysiphe cichoracearum* cause only slight damage.

0380. DARPOUX, H. 1948. The diseases of domestic oleaginous plants and their treatment. (Fr). France Min. Agric., Bull. Tech. Inform. 28/29: 193-200. 14 F844B.

Helminthosporium papaveris, *Pleospora calvescens*, *Peronospora arborescens* and *Erysiphe cichoracearum*; notes on how these fungi attack oil poppy and the treatment for the diseases.

0381. DARPOUX, H., and A. FAIVRE-AMIOT. 1949. Anatagonism of various microorganisms toward plant pathogens. (Fr). Compt. Rend. Seances Agric. France. 35: 266-269. 14 P215Bc.

Pyrenophora calvescens was especially sensitive to some of the antibiotics produced by species of actinomycetes.

0382. DARPOUX, H., and A. FAIVRE-AMIOT. 1949. Anatagonistic action of Actinomycete #105 against some microorganisms for the most part plant pathogens tested for application in control of plant diseases. (Fr.). Ann. Inst. Pasteur 76: 72-74. 448.3 An75.

An actinomycete isolated from soil exhibited definite inhibition on agar against *Dendryphium penicillatum* (*Pyrenophora calvescens*) isolated from opium poppy.

0383. DARWIN, C. 1876. The effects of cross and self fertilization in the vegetable kingdom. Murray, London. 463.38 D252E.

Automatic self-pollination and self-fertilization occur in *P. somniferum*. (pp. 108, 331, 365-366).

0384. DAWSON, R. F. 1957. Isolation and properties of a blue pigment fraction from *Papaver orientale* L. Pl. Physiol. 32 (suppl.): liii. 450 P692.

Chemical characterization of a pigment with unusual color properties.

0385. DAWSON, R. F., and C. JAMES. 1956. Alkaloids of *Papaver orientale* L. I. Qualitative detection and occurrence. Lloydia 19(1): 59-64. 442.8 L77.

Isothebaine was the major alkaloid in both seedling and adult plants. Thebaine was usually present and 2 other alkaloids were detected but not identified.

0386. DE BARY, A. 1863. Researches on the development of some parasitic fungi. (Fr). Ann. Sci. Nat. Bot. Ser. IV 20: 5-148. 450 An75.

Peronospora arborescens on the leaves of *Papaver somniferum* and *P. rhoeas*.

0387. DEBSKA, W. 1958. The preparation of a substitute for opium infusion. (Pol; summ. Rus and Eng). Diss. Pharm. 10(1): 39-51. MAM: PO 257J.

The blue-seeded variety of poppy is richer in morphine than the white-seeded and its content is maximum when the fruit is ripe. A substitute preparation for opium tincture, obtained from the straw, is identical to the official tincture and its production is economically feasible.

0388. *DEBSKA, W. 1962. Separation of selected alkaloids of the poppy. (Pol). Poznan. Towarz. Przyjaciol. Nauk, Wydzial Lekar., Prace Komisji Farm. 2(2): 23-33.

Various methods for separating selected alkaloids of poppy by paper chromatography.

0389. DE CANDOLLE, A. P. 1824. Papaveraceae, pp. 117-124. *In* A. P. De Candolle, Prodromus systematis naturalis regni vegetabilis, Vol. I. 452 D332P.

Taxonomic treatment of the family including descriptions of 26 species of *Papaver*.

0390. DE CANDOLLE, A. 1883. L'origine des plantes cultivees. Paris. 377 pp. SI: 581.6 C21.

A history of *P. somniferum* is discussed including early cultivation by the Greeks and Romans, early use by the Chinese and early mention of opium smoking. (pp. 319-322).

0391. DE CAROLIS, V. 1949. Control of poppies and Elateridae which infest the fields. (Ital). Rinascita Agr. 4(10): 2. 281.8 R47.

0392. DECSEI, L., and B. ZSADON. 1965. Chemical composition of some Hungarian poppy heads. (Hung; summ. Rus, Eng and Ger). Acta Pharm. Hung. 35(5): 231-235. MAM.

Hot-water soluble materials, holocellulose, lignin, pentosans, pectins and ash were determined.

0393. DECSEI, L., and B. ZSADON. 1972. Separation and photometrical determination of codeine and thebaine in *Papaver* extracts. (Hung; summ. Rus, Ger). Herba Hung. 11(1): 87-95, illus. 71.8 H 413.

Procedure for determining codeine and thebaine in the opium poppy.

0394. DELENK-HEYDENREICH, K., and S. PFEIFER. 1969. Alkaloids of the genus *Papaver*. XXXII. *Papaver orientale* L. (Ger). Pharmazie 24(10): 635-645. LC: RS1 P673.

Alkaloids were isolated from semi-ripe capsules and roots. Thebaine could not be detected.

0395. DEMBINSKI, F., A. HORODYSKI, and H. JARUSZEWSKA. 1962. A comparison of 17 species of spring oil plants. (Pol; summ. Eng and Rus). Pameitn. Pulawski 8: 3-82. 64.9 In7.

Of the species tested, poppy gave medium low yields under Polish conditions and so was not recommended for large scale cultivation for oil production.

0396. DENNIS, R. W. G., and C. E. FOISTER. 1942. List of diseases of economic plants recorded in Scotland. Trans. Brit. Mycol. Soc. 25: 266-306. 451 B76.

Peronospora arborescens on *Papaver somniferum* in Scotland. (p. 295).

0397. DESHPANDE, A. L., J. P. AGARWAL, and B. N. MATHUR. 1970. *Rhizoctonia bataticola* causing root-rot of opium in Rajasthan. Indian Phytopath. 22: 510-511. 464.8 In2.

Characterization of the disease on *P. somniferum* in India.

0398. DESJARDINS, R. 1948. On corn, poppies, soybeans and sunflowers. (Fr). Vie a la Campagne 37: 139-140, 172, 180-182. 80 V67.

Popular article comparing agronomic and utilitarian potential of these 4 crops. Seedling growth is discussed.

0399. DESSAINT, A. Y. 1972. The poppies are beautiful this year. Nat. Hist. 81(2): 31-37, 92-96. 500 N483J.

Poppy cultivation among the Lisu in Thailand and its effect on the living standards of the people.

0400. DETERMANN, W. 1940. The correlation between alkaloid content and number and size of latex tubes in the capsule of *Papaver somniferum* L. (Ger). Z. Pflanzenzucht. 23: 371-410. 450 Z36.

Using 4 cultivars, a direct relation was found between the alkaloid content of the capsule and the total surface of the latex tubes; also, with the surface of the vascular bundles and the number of seeds. No direct relationship existed between alkaloid content and latex tube diameter or number.

0401. DHAR, M. L., M. M. DHAR, B. N. DHAWAN, B. N. MEHROTRA, and C. RAY. 1968. Screening of Indian plants for biological activity: Part I. Indian J. Exptl. Biol. 6: 232-247. 442.8 In2.

P. somniferum extract showed antiprotozoal and anticancer activity and affected blood pressure and isolated tissue.

0402. DIDARIO, A., H. H. HARRIS, T. L. CURRY, and L. G. UTTER. 1962. Evaluation of Dacthal herbicide on trees, shrubs and herbaceous ornamentals. Proc. 16th N. E. Weed Control Conf. pp. 205-211. 79.9 N814.

Poppy was sensitive to the herbicide.

0403. DISTANOV, G. K., and E. KYDYRMYSHEV. 1962. Effect of ammonia or urea trace element complexes on the yield of farm crops. (Rus). Mikroelementy Zhizotnovodstve Rastenievodstve, Akad. Nauk Kirg. SSR 1: 131-138. 386.2 Ak13.

In poppy plants, Co and B trace fertilizers (ammonium type) increased the concentration of opium by 44-50%.

0404. DIXON, H. N. 1892. *Papaver rhoeas* var. *strigosum* Boenn. J. Bot. 30: 309. 450 J82.

The variety appears to be temporary, dependent on local causes.

0405. DJORDJEVSKI, J. 1964. Variety trials with opium poppies. (Macedonian; summ. Eng). Annu. Fac. Agric. Sylvic. Skopje, Agric. 1963-1964 17: 95-108. 21.5 Sk5.

Trials with 4 varieties producing white, yellow, blue and olive-green seeds indicate that the yellow one has the highest opium, morphine and oil content. The blue-seeded one has lower yields but commands a higher price.

0406. DOBROVOLSKIÏ, M. E. 1914. Observations on the parasitic fungi of the Podolsk government. (Rus; summ. Fr). Bolezni Rast. 8(4/5): 139-146. 464.8 Z6.

Peronospora arborescens, downy mildew on *Papaver somniferum* in USSR.

0407. DOBZOKHOTOV, V. N. 1961. Seeds of weeds. (Rus). Izdatel'stvo Sel'skokhozyaistvennoi Literatury Zhurnalov i Plakatov, Moskva. (Publication of Agricultural Literature, Journals and Posters, Moscow). 414 pp. 50 color plates. 463.46 D65.

Seed characteristic of *P. strigosum*, *P. hybridum*, *P. somniferum*, *P. dubium*, *P. rhoeas* and other genera of the Papaveraceae. (pp. 233-237).

0408. DOCEA, E., and V. SEVERIN. 1964. Indrumator pentru recunoasterea si combaterea bolilor plantelor cultivate. (A guide to the identification and control of diseases of cultivated plants). Bucharest. 368. pp. SB731 D6.

Diseases of opium poppy in Rumania: *Helminthosporium papaveris*, *Peronospora arborescens*, *Entyloma fuscum*, *Xanthomonas papavericola*, and *Erysiphe cichoracearum*.

0409. DOIDGE, E. M., A. M. BOTTONLEY, J. E. VAN DER PLANK, and G. D. PAUER. 1953. S. African Dept. Agric. Sci. Bull. 346: 1-122. 24 So84S.

Cabbage black ringspot virus on *P. somniferum* in South Africa.

0410. DOLEJS, L., and V. HANUS. 1967. Mass spectometry of rhoeadine type alkaloids. Tetrahedron 23(7): 2997-3005. 382 T29.

Alkaloids of the rhoeadine type may be divided into acetals and semiacetals, each with its own characteristic fragmentation pattern.

0411. *DOLGOVA, A. A. 1957. A study of the ontogeny of the laticiferous system in the opium poppy. (Rus). Sborn. Nauch. Rabot Mosk. Farmacevt. Inst. 1: 161-165.

Development of the latex vessels in Tian-shan race was followed from germination to seed maturity, and it is suggested that better utilization of the plant would result if the alkaloids were extracted from all organs during the period between flowering and seed maturity.

0412. DÖLLE, H. 1954. The antibiotic action of soil actinomycetes upon *Helminthosporium papaveris* Saw. (Ger). Zentralbl. Bakteriol. 2 Abt. 108: 127-133. 448.3 C33.

Out of 86 strains of actinomycetes isolated from soil in an oil-poppy field, 34 were found to be highly active when cultured, against the fungus.

0413. *DONCASTER, J. P. 1956. The rice aphid. Bull. Ent. Res. 47(4): 741-747. 421 B87.

Rhopalosiphum rufiabdominalis (Sasaki) on *P. somniferum* in Taiwan.

0414. DÖPKE, W., H. FLENTJE and P. W. JEFFS. 1969. The structures of amurine and nudaurine. Tetrahedron 24(12): 4459-4476. 382 T29.

Alkaloids found in *P. amurense* and *P. nudicaule* var. *aurantiacum*.

0415. DOROFEENKO, G. N., and V. G. KOROBROVA. 1970. New process for synthesizing 3-ketopapaverine. (Rus). Zhurn. Obshch. Khim. 40(1): 249-250. 385 Z6.

0416. DORPH-PETERSEN, K. 1910. Some researches on weed seed appearance and vitality. (Dan). Tidsskr. Planteavl 17: 584-626. 11 T439.

P. rhoeas is included.

0417. DORPH-PETERSEN, K. 1925. Examinations of the occurrence and vitality of various weed seed species under different conditions made at the Danish State Seed Testing Station during the years 1896-1923. Fourth Int. Seed. Test. Congr. Rep. pp. 124-138. 61.9 IN824.

Seeds of *P. somniferum* started germinating soon after they had been harvested and continued for several months until 92% germinated.

0418. DOTT, D. B. 1924. Opium powder: Loss of morphine on keeping (II). Pharm. J. 112: 337. 396.8 P49.

Opium assayed each month for a year showed no loss of morphine. Drying opium at 100°C did not affect the morphine content.

0419. DOWSON, W. J. 1949. Manual of bacterial plant diseases. Adam and Charles Black, London. 183 pp. 464.2 D76.

Xanthomonas papavericola causes black spot and blotches on all above ground parts of *P. orientale* and other species of *Papaver* in U.S. The disease has been reported from Russia.

0420. DROZDZ, B., and Z. KOWALEWSKI. 1966. The components of the neutral fraction of the herbs of *Papaver rhoeas* L. (Pol; summ. Rus and Eng). Diss. Pharm. 17(4): 527-531. John Crear Library.

Cyclolaudenol, (+)-10-nonacosanol, beta-sitosterol and a crystalline compound were found.

0421. DUBUIS, A., and L. FAUREL. 1963. Botanical collections of R. Pasquier in Iran (April 13 to July 16, 1957). (Fr). Bull. Soc. Hist. Nat. Afrique N. 54(1): 85-130. 410.9 So125.

The *Papaver* collected included *P. macrostomum*, *P. pasquieri* and *P. pavoninum*.

0422. DU CHALIOT, C., and S. MARONGIU. 1947. Opium obtained in Sardinia. (Ital). Boll. Chim. Farm. 86: 233-237. Francis A. Countaway Libr. Med., Boston.

Cultivation and morphine content of opium obtained from Sardinia.

0423. DUCHNOWSKA, A., and E. PAWELCZYK. 1960. Analysis of medicinal poppies as a guide to the propagation of morphine species. (Pol; summ. Rus and Ger). Biul. Inst. Rosl. Leczniczych 6(1): 31-42. 451 P87.

Morphine content of many varieties compared over a 3-year period.

0424. DUCOS, P. 1937. On some Pleospora of Auvergne. (Fr). Bull. Soc. Mycol. France 53(2): 169-174. 451 P213.

Helminthosporium papaveris on P. somniferum in France.

0425. DUMONT, G. 1961. The opium poppy harvest. (Fr). Oleagineux 16(6): 365-368. 77.8 012.

Hand harvesting of oilseed poppies gives the best results but demands about 110 man-hours/ha. Mechanical methods for harvesting and cleaning the seeds are described.

0426. DUMONT, G., and P. BOULANGER. 1962. Poppy cultivation in France. (Fr). Oleagineux 17(2): 125-127. 77.8 012.

Cultural requirements. Poppies can be grown successfully instead of sugar beets at the beginning of crop rotation.

0427. DUTTA, N. L., and C. QUASIM. 1969. Neutral constituents of Indian opium (Papaver somniferum). Indian J. Chem. 7(12): 1276-1278. 385 In294.

Identification of components of the alkaloid-free press cake left after commercial isolation of the alkaloids.

0428. *DVORAK, K. 1948. Some experience in the control of crop pests in 1948 in Moravia. (Czech). Ochr. Rostl. 21(5/6): 61-66.

Ceutorrhynchus macula-alba causes serious injury on poppy heads and is very susceptible to DDT.

0429. DYER, R. A. 1949. Botanical surveys and control of plant diseases. Farming South Africa 24: 119-121. 24 So842.

Cabbage ring-spot virus on opium and Shirley poppies is severe and often fatal to the plants.

0430. DYKE, S. F., and D. W. BROWN. 1969. The chemistry of cryptopine. II. Pseudocryptopine chloride. Tetrahedron 25(22): 5375-5381. 382 T29.

The structure originally suggested by W. H. Perkin for psuedocryptopine chloride (an opium alkaloid) was corrected.

0431. DZHAFAROV, S. A. 1960. Fungi of the order Peronosporales parasitizing agricultural crops in the Talysh. (Azerb; summ. Rus). Dokl. Akad. Nauk Azerb. SSR 16: 293-297. 511 AK147D.

Peronospora arborescens collected on Papaver somniferum in Azerbaijan.

0432. DZONOVA, M. 1955. Poppy heads, after morphine extraction, for use as an organic manure. (Serb, summ. Ger). Annu. Fac. Agric. Sylvic., Univ. Skopje 1953/54 7: 217-222. 21.5 Sk5.

Compost from spent poppy heads compared favorably with farmyard manure and is considered to be valuble for hot bed culture.

0433. EBERHARDT, F., and P. MARTIN. 1957. The problem of root excretions and its significance in the reciprocal influence of higher plants. (Ger; summ. Eng). Z. Pflanzenkrankh. Pflanzenschutz 64(4): 193-205. 464.8 Z3.

From studies of fluorescent compounds excreted by seedlings of P. somniferum, it was concluded that root excretions play a minor role in the mutual relations between higher plants while substances from decaying cells can be important.

0434. EDKINS, J. 1889. Opium: Historical note, or the poppy in China. In China-Imperial Maritime Customs. II. Special series No. 13. Statistical Department of the Inspectorate General of Customs, Shanghai. 50 pp. Harvard-Yenching Libr.

Interesting account of poppy cultivation and use in China. The earliest mention in the literature of cultivation was in the 8th century. The capsules were first used in medicine during the latter part of the 12th century and reference to opium smoking was not found until the early 17th century.

0435. EGIAZARYAN, I. S., N. S. KAGRAMANYAN, and V. A. MNATSAKANYAN. 1969. Alkaloids of the Persian poppy. (Rus). Arm. Khim. Zh. 22(5): 459-460. 385 Er42.

Protopine, roemerine, fugapavine, armepavine, isofugapavine and floripavine were identified from P. persicum.

0436. EGIERSZDORFF, I. and T. DELONG. 1967. Some aspects of the production, turnover and control of narcotic drugs in Poland. Bull. Narc. 19(3): 1-6. LC: HV5800 B8.

Problems of poppy cultivation, morphine determination and export and import of narcotic drugs in Poland.

0437. EICHLER, H. 1965. Supplement to J. M. Black's Flora of South Australia. Adelaide, Australia. 385 pp. SI: QK455 D34.

Papaveraceae (pp. 151-152) include P. aculeatum, P. setigerum, P. hybridum and P. argemone.

0438. EKSTRAN, H. 1941. A disease on poppy. (Swed). Vaxtskyddsnotiser 5: 50-53. 464.9 Sw3V.

Pleospora calvescens on Papaver somniferum in Sweden.

0439. EL HADKA, A. A. 1965. Forty years of the campaign against narcotic drugs in the United Arab Republic. Bull. Narc. 27(4): 1-12. LC: HV5800 B8.

"White drugs" (cocaine, heroin and morphine) were unknown in Egypt until World War I. "Black drugs" (opium and hashish) continue to cause problems to the Egyptian authorities. Before 1926, opium cultivation was permitted in Upper Egypt for export or pharmaceutical use.

0440. ELIADE, E. 1960. Contributions to the knowledge of plant diseases from the Bucharest Botanical Garden. (Rum; summ. Rus and Ger). Lucr. Grad. Bot. Bucuresti 1959: 115-129. CDA.

Peronospora arborescens found on the leaves of Papaver somniferum.

0441. ELKAN, L. 1839. Tentamen Monographiae Generis Papaver. Grafe et Unzer, Regiomontii Borussorum (Kaliningrad, U.S.S.R.). 36 pp.

A monographic treatment including morphology, division of the genus and descriptions of the species.

0442. ELLIOTT, C. 1951. Manual of bacterial plant pathogens. 2nd ed. Chronica Botanica Co., Waltham, Mass. 186 pp. 450 An77.

Erwinia aroidea reported on P. somniferum, P. alpinum, P. orientale and P. rhoeas. (pp. 35-36).

0443. ELLISON, W. J. 1946. Oriental poppies. Canad. Hort. 69: 183. 80 C16F.

The best cultivars for the garden.

0444. ENDRIZZI, L. 1959. Poppy, now grown for opium. (Ital). Giorn. Agric. Domen. 69(16): 151. 16 ItlG.

Cultivation details for poppy in the mountain areas of Italy. Seed yield is 1000-1800 kg/ha (occasionally as high as 3000 kg) with an oil content of 50% by weight.

0445. ENTRES, K. 1948. Corn poppy, wild poppy. (*Papaver rhoeas* L.). (Ger). Obst & Gart. 3: 16. 80 Ob75.

Cultivation and harvest of *P. rhoeas* for medicinal purposes.

0446. ERDTMAN, G. 1952. Pollen morphology and plant taxonomy--Angiosperms. Chronica Botanica Co., Waltham, Mass. 539 pp. 463.46 Er2.

Of the palynologically heterogeneous three subfamilies in the Papaveraceae (pp. 309-313), most members of Papaveroideae are 3-colpate.

0447. ERDTMAN, G. 1954. An introduction to pollen analysis. Chronica Botanica Co., Waltham, Mass. 239 pp. 402.1 Er2 1954.

Description of pollen grains of *P. orientale* is given on p. 115.

0448. *ERNST, W. R. 1962. A comparative morphology of the Papaveraceae. Ph.D. Dissertation, Stanford Univ., California. 213 pp.

Deals primarily with floral morphology at the generic level, recognizing 4 subfamilies, excluding Fumariaceae.

0449. ERNST, W. R. 1962. The genera of Papaveraceae and Fumariaceae in the southeastern United States. J. Arnold Arbor. 43: 315-343. 451 Ar6J.

A systematic treatment for the genera for southeastern U.S.

0450. ETTIG, B. 1955. On reciprocal antibiotic effects between *Helminthosporium papaveris* Saw. and soil bacteria. (Ger). Zentralbl. Bakteriol. Hyg., 2 Abt. 108: 530-535. 448.3 C33.

Of 90 strains of bacteria isolated from soils where poppies were grown, 11 actively inhibited the growth of *Helminthosporium papaveris*.

0451. EVERETT, T. H. 1955. Oriental poppies: What you should know to grow them. Fl. Grower 42(6): 72-74. 80 M72.

Popular question and answer article.

0452. EVERS, N., and D. CALDWELL. 1959. Opium alkaloids, pp. 201-214. *In* N. Evers and D. Caldwell. The chemistry of drugs. 3rd ed. Interscience Publishers, Inc., New York. LC: RS421 E83.

General discussion of the chemistry of the opium alkaloids.

0453. EWART, A. J. 1930. Flora of Victoria. University Press, Melbourne. 1257 pp. 460.34 EW1F.

Papaveraceae (pp. 523-527) include *P. hybridum*, *P. aculeatum*, *P. rhoeas* and *P. dubium*.

0454. EXELL, A. W. 1931. Phyllody in *Papaver nudicaule*. Gard. Chron. 90: 415. 80 G162.

Abnormalities of the sepals which have developed into large green structures.

0455. FABERGE, A. C. 1942. Genetics of the Scapiflora section of *Papaver*. I. The garden Iceland poppy. J. Genet. 44: 169-193. 442.8 J823.

In the wild, *P. nudicaule* exists as a complex of intergrading forms, most of which are found in garden strains. Eleven genetic factors are described (5 controlling flower color) and their behavior in hybrids is described.

0456. FABERGE, A. C. 1943. Genetics of the Scapiflora section of *Papaver*. II. The alpine poppy. J. Genet. 45: 139-170. 442.8 J823.

Crosses were used to identify eleven gene loci controlling flower color, hairiness and petal shape in *P. alpinum*. Taxonomy and geography of the genus is discussed.

0457. FABERGE, A. C. 1944. Genetics of the Scapiflora section of *Papaver*. III. Interspecific hybrids and genetic homology. J. Genet. 46: 125-149. 442.8 J823.

Hybrids between *P. alpinum* and *P. nudicaule* are described.

0458. FAHMY, I. R., M. A. EL-KEIY, and F. M. HASIM. 1957. A pharmacognostical study of the seeds of a species of the genus _Papaver_ grown in Egypt. J. Pharm. Pharmacol. 9: 541-548. FDA.

A comparison of the anatomy of seeds of _P_. _somniferum_, _P_. _rhoeas_, _P_. _dubium_, _P_. _argemone_, _P_. _nudicaule_ and _P_. _orientale_ to aid identification.

0459. FAIRBAIRN, J. W. 1965. Some experimental work on the problem of the function of alkaloids in plants. Beitr. Biochem. Physiol. Naturstoffen, Festschrift Kurt Mothes pp. 113-119. Linda Hall Libr., Kansas City, Mo.

Alkaloidal content of the poppy capsule increases during the first 2 weeks after petal fall, then decreases with further maturation. Latex samples taken at hourly intervals show rapid changes in the pattern of alkaloids. When codeine and thebaine accumulation and disappearance are proceeding actively there is no increase in morphine, in fact there may be a decrease.

0460. FAIRBAIRN, J. W. 1966. Variations in the alkaloidal pattern in developing fruits of _Conium_ _maculatum_ L. and _Papaver_ _somniferum_ L. Abh. Deutsch. Akad. Wiss. Berlin, Kl. Chem. 1966(3): 141-145. 509 D482.

Both coniine and morphine are not end-products but are transformed into other substances in the plant.

0461. FAIRBAIRN, J. W., and M. DJOTE. 1970. The alkaloids of _Papaver_ _somniferum_ L. IX. Alkaloid biosynthesis and metabolism in an organelle fraction in _Papaver_ _somniferum_. Phytochemistry 9(4): 739-742. 450 P5622.

The pellet produced by centrifuging dilute latex at 1000-3000 _g_ could synthesize morphine from dihydroxyphenylalanine _in_ _vitro_. Further metabolism of morphine probably occurs in the stem latex rather than the capsule latex.

0462. FAIRBAIRN, J. W., M. DJOTE, and A. PATTERSON. 1968. The alkaloids of _Papaver_ _somniferum_ L. VII. Biosynthetic activity of the isolated latex. Phytochemistry 7(12): 2111-2116. 450 P5622.

Radioactive 4,5-dihydroxyphenylalanine was incorporated into morphine by isolated latex, indicating it is cytoplasmic with adequate organelle activity.

0463. FAIRBAIRN, J. W., and S. EL-MASRY. 1967. The alkaloids of Papaver somniferum L. Fate of the "end-product" alkaloid morphine. Phytochemistry 6: 499-504. 450 P5622.

Labeled morphine fed to the phloem region below the developing capsule was metabolized in the latex to 2 non-alkaloid substances and translocated out of the latex.

0464. FAIRBAIRN, J. W., and S. EL-MASRY. 1968. The alkaloids of Papaver somniferum L. VI. "Bound" morphine and seed development. Phytochemistry 7(2): 181-187. 450 P5622.

Radioactive morphine supplied to the latex of the capsule is rapidly metabolized to bound and unbound alkaloids, the bound forms being stored in the seed and broken down during germination. Depriving capsules of latex produces seeds in which germination rate, root hair and chlorophyll production are reduced.

0465. FAIRBAIRN, J. W., and L. D. KAPOOR. 1960. The laticiferous vessels of Papaver somniferum L. Pl. Med. 8(1): 49-61. 450 P697.

Laticifers are absent from stamens, ovules, seeds and young seedlings and are most abundant in the outer mesocarp of the capsule about 2 weeks after petal fall.

0466. FAIRBAIRN, J. W., J. M. PALMER, and A. PATERSON. 1968. The alkaloids of Papaver somniferum L. VIII. Organelle activity of the isolated latex. Phytochemistry 7(12): 2117-2121. 450 P5622.

Differential centrifugation of latex showed high gaseous exchange in mitochondrial fractions. Alkaloids were present in the heavy fractions and it is suggested that their biosynthesis is associated with heavy particles.

0467. FAIRBAIRN, J. W., and A. PATERSON. 1966. Alkaloids as possible intermediates in plant metabolism. Nature 210: 1163-1164. 472 N21.

Radioactive morphine fed to P. somniferum plants just below the developing capsule (18 days after petal fall) was metabolized to non-alkaloidal substances, suggesting alkaloids are not dead-end compounds.

0468. FAIRBAIRN, J. W., A. PATERSON, and G. WASSEL. 1964. The alkaloids of Papaver somniferum L. II. ^{14}C isotopic studies of the rapid changes in the major alkaloids. Phytochemistry 3(5): 577-582. 450 P5622.

Poppy capsules were fed labeled tyrosine and the latex was sampled at intervals. The alkaloid content changed frequently and morphine disappeared during certain periods.

0469. *FAIRBAIRN, J. W., and G. WASSEL. 1963. Estimation of morphine, codeine and thebaine in opium and in poppy latex by paper chromatography. J. Pharm. and Pharmacol. Suppl. 15: 216-221.

Separation of morphine from mixed alkaloids by paper chromatography, a method especially suited for small quantities of raw material.

0470. FAIRBAIRN, J. W., and G. WASSEL. 1964. The alkaloids of _Papaver somniferum_ L. Evidence for a rapid turnover of the major alkaloids. Phytochemistry 3(2): 253-258. 450 P5622.

Morphine, codeine and thebaine content showed rapid changes in the latex of the developing fruit during a 24 hour period, suggesting they play an active part in metabolism. The morphine content decreases at certain times of the day, possibly due to its conversion to a non-alkaloid molecule.

0471. FAIRBAIRN, J. W., and G. WASSEL. 1964. The alkaloids of _Papaver somniferum_ L. III. Biosynthesis in the isolated latex. Phytochemistry 3(5): 583-585. 450 P5622.

Solid labeled tyrosine mixed with poppy latex showed, after 10 min., significant incorporation of radioactivity into the alkaloids. The alkaloid pattern shows rapid variation with time, and the morphine "disappears" (transformed into a non-alkaloid molecule) from the latex.

0472. *FAJERSSON, F. 1946. Trials in disinfecting poppy seed. (Swed). Svensk. Frotidn. 15: 102-105.

Germination tests show that disinfectants Uspulun, Granosan and Arasan in doses of 2-4 g disinfectant per kg poppy seed increased germination in fungus infected seed; over-dosing caused reduction in number of plants.

0473. FARKAS, S., and I. BAYER. 1968. Quantitative determination of poppy alkaloids. (Hung; summ. Rus and Ger). Herba Hung. 7(1): 37-46. 71.8 H413.

Five alkaloids separated by thin-layer chromatography.

0474. FARKAS-RIEDEL, L. 1967. Changes in peroxidase activity during ontogenesis in _Papaver somniferum_ var. SB-Morfin. Acta Bot. Acad. Hung. 13(3/4): 235-238. 450 Ac823.

Peroxidase activity was most intensive in the lowest leaf of the young plant and diminished toward the top. In later stages, a second maximum appeared in young but fully developed leaves. In capsules highest activity was 2-3 weeks after flowering. No activity was found in roots and only traces in seeds.

0475. FARKAS-RIEDEL, L. 1969. Studies on the changes in peroxidase activity in Papaver somniferum L. varieties during ontogenesis. Acta Agron. Acad. Sci. Hung. 18: 317-323. 19 Ac8.

Peroxidase activity in the capsule reached a maximum about 2 weeks after flowering and then declined to zero. Morphine content increased at the same time and then gradually fell, except for the variety Soproni which remained constant.

0476. FARMILO, C. G., and P. M. KENNETT. 1950. Methods of determining the origin of opium by chemical and physical means--further data on "Porphyroxine-Meconidine." U.N. Econ. & Soc. Council, document E/CN.7/207, pp. 2-10.

Opium extraction with water at the natural opium pH and porphyroxine-meconidine extraction at various pH values, with opium from India yielding usually high to very high value, that from Iran usually low to very low value, and intermediate values from Turkey, Japan and Yugoslavia.

0477. FARMILO, C. G., H. L. J. RHODES, H. R. L. HART, and H. TAYLOR. 1953. Detection of morphine in Papaver setigerum DC. Bull. Narc. 5(1): 26-31. LC: HV5800 B8.

Morphine was detected in the pod, bud and leafy parts of P. setigerum. The haploid number, n = 22, is twice that of P. somniferum. Twenty-four other species of poppy were examined and no morphine was found in any of them.

0478. FARNSWORTH, N. R. 1968. Plants as sources of new medicines against cancer. (Ger). Pharm. Ztg. 113(35): 1293-1307. 396.8 P496.

A literature survey of plants with anti-tumor or other cytotoxic activity. P. orientale and P. rhoeas are listed.

0479. FEDDE, F. 1905. The geographical distribution of Papaveraceae. (Ger). Bot. Jahrb. Syst. 36: 28-32. 450 En3B.

Distribution of genera within 4 subfamilies.

0480. FEDDE, F. 1909. Four new forms of Papaver nudicaule from the Pacific region. (Ger). Repert. Spec. Nov. Regni Veg. 7: 255-257. 450 R29.

New forms from Alberta, British Columbia, Colorado and Japan.

0481. FEDDE, F. 1909. Papaveraceae-Hypecoideae and Papaveraceae-Papaveroideae. (Ger and Lat). Das Pflanzenreich IV. 104 (Heft 40): 1-430. 452 En3P.

The basic taxonomic work on the Papaveraceae with keys and descriptions. The family is treated as composed of subfamilies Hypecoideae, Papaveroideae and Fumaroideae, the last excluded.

0482. FEDDE, F. 1936. Papaveraceae. In Engler and Harms Nat. Pflanzenfam. ed. 2, 17b: 5-145.

Complete synopsis of the entire family covering for the first time the subfamily Fumarioideae. There are detailed capsule illustrations.

0483. FEDOROV, A. A. 1969. Chromosome numbers of flowering plants. (Rus). Akad. Nauk SSSR, Moscow. 926 pp. QK725 K7.

Chromosome counts for Papaveraceae are given on pp. 480-485, including numbers for 65 species of Papaver.

0484. FEINBRUN, N. 1963. Chromosomes of some East-Mediterranean Papaver species. Caryologia 16(3): 649-652. 442.8 C25.

Chromosome numbers for 7 species of Papaver sect. Orthorhoeades.

0485. FEINBRUN, N. 1963. Taxonomic studies on Papaver sect. Orothorhoeades of Palestine and of some other Mediterranean countries. Israel J. Bot. 12: 74-96. 450 Is7.

Complete taxonomic treatment of this section in the eastern Mediterranean region, including keys, maps, morphology and chromosome numbers.

0486. *FEKIN, A. D. 1922. Diseases of cultivated plants observed in the Viatka Government during the summer of 1922. (Rus). Trudy Cletvertogo Vseros. Entomol. Fitopathol. S'ezd. Moskve, Dec. 8-14, 1922: 108-115.

Cladosporium herbarum (Pers.) Fr. causes leaf spot on P. somniferum in USSR.

0487. FELKLOVA, M. 1964. Changes in the anatomical structure of _Papaver somniferum_ L. in the process of ontogenesis. Acta Fac. Pharm. Bohemoslov. 9: 26. LC: RS1 B69.

Laticiferous vessels were studied in individual organs during development. The vessels were not found in the seed but appeared early in the seedling.

0488. FELKLOVA, M., and K. BABKOVA. 1958. Anatomical studies on the laticiferous vessels in _Papaver somniferum_ during the vegetative period. (Ger). Pharmazie 13: 220-229. LC: RS1 P673.

Micro-studies of latex tubes occurring in all organs were made during ontogenesis. Period of maximum duct formation is correlated with maximum morphine content.

0489. FELKLOVA, M., and K. LEVAKOVA. 1967. The influence of light on growth and contained substances in _Papaver somniferum_. (Ger; summ. Rus and Eng). Acta Fac. Pharm., Univ. Comeniana 14: 7-44. LC: RS1 B69.

Morphine formation was inhibited with shading and some already present disappeared. Shaded plants produced less fat but the percentage of oil in the seed is approximately equal to that of the controls.

0490. FELKLOVA, M., and J. MIKULECKA. 1958. Fluctuation of the morphine contents during the vegetation of the plant _Papaver somniferum_ L. (Czech; summ. Rus, Eng and Ger). Sborn. Ceskoslov. Akad. Zemed. Ved. Rostl. Vyroba 4(2): 149-164. 64.9 C33.

Morphine content of plant parts increased with irrigation; 0.411% of capsules compared to 0.338% in non-irrigated.

0491. FENAROLI, L. 1955. Flora delle Alpi. Aldo Martello, Milano. 369 pp. 459.8 F35.

Papaveraceae (pp. 143-144) include _P. pyrenaicum_ and _P. alpinum_.

0492. FENELL, S. 1967. Poppies - from spring to fall. Org. Gard. and Farming 14(4): 100, 102, 104-105. 57.8 Or32.

Popular article on the cultivation of _P. orientale_ and _P. nudicaule_.

0493. FERENCZY, L. 1962. New data to superselective weed control. II. Researches with 2,4-dichlorophenoxyethylamine and 2,4-dichlorophenoxyacetonitrile. Acta. Agron. Acad. Sci. Hung. 11: 281-292. 19 Ac8.

0494. FINLAY, J. 1964. Plants in New Zealand poisonous to man. Dept. of Health, Wellington, New Zealand. 42 pp. 452.83 F49.

The unripe seed capsule is the poisonous part of Iceland, Shirley and oriental poppies.

0495. FIRSOVA, M. K. 1937. Effect of low temperature and freezing on the germinating capacity of seeds of the opium poppy (*Papaver somniferum* L.). (Rus; summ. Eng). Trudy Prikl. Bot., Ser. 4, Semenov. 2: 121-124. 451 R92Se.

Seeds withstand frost well, and even repeated freezing and thawing does not lower germination appreciably. Seedling and young plants can withstand temperatures as low as -3° or -4°C.

0496. FISCHER, H. A. 1948. How to grow big poppies. Better Homes & Gard. 26(12): 148-150. 80 F9424.

Garden cultivation of *P. orientale* including cultivars.

0497. FISCHER, R. 1965. Aging of linseed and poppy seed meal. I. Introduction and literature about fat spoilage through aging. (Ger). Deut. Apotheker-Ztg. 105(6): 173-178. 396.8 Su2.

Literature survey.

0498. FISCHER, R. 1965. Aging of linseed and poppy seed meal. II. Further literature report on oxidative fat spoilage through aging, and on the influence of radiation on fats. (Ger). Deut. Apotheker-Ztg. 105(9): 290-293. 396.8 Su2.

Review.

0499. FISCHER, R. 1965. Aging of flaxseed and poppy seed meal. III. The degree of acidity of the linseed and poppy seed oils as a criterion of rancidity. (Ger). Deut. Apotheker-Ztg. 105(13): 415-418. 396.8 Su2.

Free fatty acids increased as the meal became more rancid.

0500. FISCHER, R. 1965. Aging of flaxseed and poppy seed meal. IV. Change in the refraction of the oils with relation to aging. (Ger). Deut. Apotheker-Ztg. 105(29): 967-971. 396.8 Su2.

Free fatty acids in the oil increased more with storage in air than in the absence of air.

0501. FITTING, H. 1922. On the influence of light and dark on the poppy stalk. (Ger). Jahrb. Wiss. Bot. 61: 1-23. 450 Q93J.

The stalks of *P. rhoeas* and *P. hybridum* are positively phototropic while *P. atlanticum* is weakly phototropic. The stems are not influenced by blue or yellow light.

0502. FLACHS, K. 1936. Diseases and pests of oil-plants. (Ger). Nachr. über Schädlingsbekämpfung 11: 130-148. 464.8 N112.

Discussion of 10 fungi and 11 insects which attack poppy.

0503. FLEISCHHACKER, W., R. HLOCH, and F. VIEBÖCK. 1968. 7,8-Dehydrometathebainone methoperchlorate, the primary product of acid action on metho salts of thebaine. (Ger; summ. Eng). Monatsh. Chem. 99(4): 1568-1569. 384 M74.

0504. FLENTJE, H., and W. DOPKE. 1966. 13-Oxomuramine, an alkaloid from *Papaver nudicaule* var. *croceum*. (Ger). Pharmazie 21: 321-322. RS1 P673.

0505. FLENTJE, H., W. DOPKE, and P. W. JEFFS. 1966. Amuronine and amuroline, two new dihydroproaporphine alkaloids. (Ger). Pharmazie 21(6): 379-380. RS1 P673.

Isolated from *P. nudicaule* var. *amurense*.

0506. FOISTER, C. E. 1961. The economic plant diseases of Scotland. A survey and check list covering the years 1924-1957. Scotland Dept. Agric. Fish. Tech. Bull. 1: 1-209.

Peronospora arborescens occurs on *Papaver somniferum* and *P. dubium* causing mildew.

0507. FOLDESI, D. 1966. Home growing and house garden cultivation of poppy. (Hung). Kerteszet Szolesz. 15(5): 13. 80 K474.

0508. FORT, J. 1965. Giver of delight or liberator of sin: Drug use and "addiction" in Asia. Bull. Narc. 27(4): 13-19. LC: HV5800 B8.

Drugs have been accepted and even encouraged in many Asian countries so that control is difficult.

0509. FRANKEL, J. S., W. STONEBURNER, and J. B. BROWN. 1943. Studies on the chemistry of the fatty acids. XI. The isolation of linoleic acid from vegetable oils by low temperature crystallization. J. Amer. Chem. Soc. 65(2): 259-262. 381 Am33J.

The linoleic acid prepared by low temperature crystallization from a number of oils including poppyseed oil is identical with that isolated from corn oil.

0510. FRANZKE, C., and P. STOLZ. 1966. The occurrence of mono- and diglycerides in fats from ripening plant seeds. (Ger). Fette Seifen Anstrichm. 68(8): 591-594. 384 C422.

Seeds of sunflower, poppy, flax and lupine.

0511. FRASZEWSKA, T. 1962. Growth dynamics and morphological features of eight spring oil-yielding plants. (Pol; summ. Eng and Rus). Pamietn. Pulawski 5: 131-156. 64.9 In7.

In the course of growth, poppy had a sudden growth inhibition after attaining the maximal diurnal growth rate at flowering time. The most constant morphological features were dimensions of cotyledons, height of plants and dimensions of fruits and seeds. Yields of seeds, number of flowers and leaves were very variable.

0512. FRAYMOUTH, J. 1956. Haustoria of the Peronosporales. Trans. Brit. Mycol. Soc. 39: 79-107. 451 B76.

Peronospora arborescens on Papaver rhoeas in England.

0513. FREDERIKSEN, P. S. 1960. Quality of Danish grown seed of white mustard, oil flax and opium poppy. (Dan). Dansk Frøanl 43(13): 251-257. 61.8 D23.

Poppy seed was investigated for purity, fat content and color.

0514. FREE, J. B. 1970. Insect Pollination of Crops. Academic Press, London and New York. 544 pp.

Flowers of P. somniferum (pp. 430-431) are vigorously worked by bees and other insects of pollen; there are no nectaries.

0515. FRIEDEL, J. 1926. Some observations on the anatomical system of the Papaveraceae. (Fr). Compt. Rend. Assoc. Franc. Avenc. Sci. Lyon 50: 351-352. 505 A57.

Comparison between various genera of the Papaveraceae, including Papaver.

0516. FRIEDEL, J. 1927. The filiation of Papaveraceae. (Fr). Compt. Rend. Hebd. Seances Acad. Sci. 96: 1159-1160. 442.9 P21.

Preliminary note discussing symmetry in Papaveraceae. The Old World species are binary, the New World are divided into 2 groups, binary and tertiary. Of the binary, the most complex is Papaver.

0517. FRIEDEL, J. 1928. Filiation of Papaveraceae. (Fr). Bull. Soc. Bot. France 74: 673-688. 451 F84B.

Relationships of genera based on flower structure.

0518. FRIEDEL, J. 1930. Filiation of Papaveraceae (3rd note). Conclusions from orthogenesis of the fruit. Genera: Roemeria, Meconopsis, Papaver and Argemone. (Fr). Bull. Soc. Bot. France 77: 36-42. 451 F84B.

Relationship of genera based on fruit development.

0519. FRITEL, P.-H. 1920. On the existence of the poppy (Papaver somniferum var. nigrum DC.) in the Pleistocene of Provence. (Fr). Bull. Soc. Geol. France 20: 207-208.

A well-preserved capsule of a poppy from Aygalades, Bouches-du-Rhone (France), contained in a tuff of middle Pleistocene age, is described and illustrated.

0520. FROLOVA, M. 1968. Oil poppies in Kazakhstan. (Rus). Zernovye Maslich. Kul't. 6: 40-41. Sb183 Z4.

Agropolitical discussion of production of poppy seed and capsules for government monopoly. Methods of cultivation and harvesting are given.

0521. FRÖMMING K. H., G. SCHNECK, and H. J. KLUGE. 1962. Quantitative determination of some substances contained in poppy capsules (Papaver somniferum L.). (Ger). Deut. Apotheker-Ztg. 102(40): 1276-1277. 396.8 Su2.

Phenoloxidase, in the presence of p-coumaric acid and caffeic acid contained in poppy heads, causes a decrease in the morphine content.

0522. FRON, G. 1943. On a disease of the oil poppy. (Fr). Compt. Rend. Seances Acad. Agric. France 29: 358-359. 14P 215Bc.

In France, 10% of P. somniferum plants may be sterile due to downy mildew, Peronospora arborescens.

0523. FU, C. 1972. Alkaloids of Papaver somniferum L.: Biosynthetic studies and characterization of new opium alkaloids. Univ. Microfilms, Diss. Abstr. Int. B 33(2): 653.

Radioactive reticuline, codamine and laudanine were synthesized and fed to opium poppies. Incorporation into alkaloids was studied giving possible intermediates in biosynthesis.

0524. FUCHS, L. 1932. Investigations of poppy fruits in different stages of maturity. (Ger). Pharm. Monatschefte 13: 223-225. 396.8 P4932.

Oil content of seeds rose sharply to the half-ripe stage and slowly thereafter. The iodine number of unripe seeds is slightly lower than mature seeds. Morphine content of the capsule is less in unripe than half-ripe fruit.

0525. FUJIOKA, Y. 1952. List of crop diseases in Japan. Gen. HQ. Supreme Commander Allied Powers, Tokyo. Econ. Sci. Sec. Nat. Res. Div., Prelim. Study 73: 1-212. 9 Su72.

The following occur on *P. somniferum*: *Bacillus aroideae*, *Bacterium papavericola*, B. *papaveris*, *Botrytis cinerea*, *Cercospora papaveri*, *Erysiphe cichoracearum*, *Peronospora arborescens* and *Sclerotinia sclerotiorum*. (pp. 113-114).

0526. FUJITA, S., T. KAWATANI, and K. KURIHARA. 1967. Destructive effect of vapour heating and gamma-ray radiation on the germination of *Papaver somniferum* L. and *Cannabis sativa* L. I. (Jap; summ. Eng). Bull. Natl. Inst. Hyg. Sci. (Tokyo) 85: 68-71. LC: 499.074 K33S.

Vapor heating almost completely destroyed the germinating power of *P. somniferum* at pressures of 3 lb. for 2 min. or 1 lb. for 3 min. The effect of gamma-ray radiation was significant at doses greater than 80,000 r.

0527. FUKAMAUCHI, H., R. IDENO, and N. SANBONGI. 1970. Precision spectrophotometric determination of opium alkaloids. I. (Jap; summ. Eng). J. Pharm. Soc. Japan 90(8): 1039-1047. 396.9 P49.

An attempt to quantitatively separate alkaloids by spectrophotometric methods using artificially prepared standard solutions.

0528. *FULARA, A. 1968. Important diseases of poppy. (Pol). Ochr. Rostl. 12(3): 16-17.

Downy mildew (*Peronospora arborescens*), helminthosporiosis (*Helminthosporium papaveris*), mosaic and another virus disease of opium poppy in Poland.

0529. FULLER, H. 1953. Poppies, lots of poppies. Home Gard. 22(2): 50-54. 80 H756.

Oriental poppies in the garden.

0530. FULTON, C. C. 1929. Aldehyde-oxidation reactions for phenols, particularily the opium alkaloids. J. Assoc. Off. Agric. Chem. 12: 434-441. 381 As7.

Tests are given for thebaine, narceine, pseudomorphine and amorphine.

0531. FULTON, C. C. 1938. Fröhde's reagent: A reagent for morphine and for other phenolic compounds. J. Lab. Clin. Med. 23: 625-630. 448.8 J8233.

The reagent provides a sensitive and specific test for morphine.

0532. FULTON, C. C. 1944. The opium poppy and other poppies. U.S. Government Printing Office, Washington. 85 pp. 151.622 Op3.

Comprehensive study of the poppy: cultivation, taxonomy, alkaloids, uses, etc.

0533. FULTON, C. C. 1948. Methods of determining the origin of opium by chemical and physical means. Examination of opium for distinguishing characteristics. Some tentative methods. U.N. Econ. and Soc. Council, document E/CN.7/117/Add.1, pp. 2-11.

Codeine, the third largest alkaloid of opium in amount, averages 0.7% in Turkish, 1.6% in Yugoslavia, and 2-4% in Iranian, Afghan and Indian opiums.

0534. FULTON, C. C. 1948. Methods of determining the origin of opium by chemical and physical means. Examination of opium for distinguishing characteristics. Some tentative methods. U.N. Econ. & Soc. Council, document E/CN.7/117/Add.2, pp. 1-25.

Characteristics, chemical and physical, are tabulated for opium from India, Manchuria, China, Iran, based on the porphyroxine-meconidine test.

0535. FULTON, C. C. 1948. On determining the origin of opium. U.N. Econ. & Soc. Council, document E/CN.7/117, part II A, pp. 3-16.

Methods for detecting the origin of opium samples.

0536. FULTON, C. C. 1948. Photomicrographs of opium crystals. U.N. Econ. & Soc. Council, document E/CN.7/117, part II C, pp. 32-47.

0537. FULTON, C. C. 1948. Some minor alkaloids of opium. I. Porphyroxine-Meconidine. U.N. Econ. & Soc. Council, document E/CN.7/117. part II D, pp. 48-51.

Methods for detecting minor alkaloids in opium, as porphyroxine and meconidine.

0538. FÜNFSTÜCK, M. 1883. On the question of the active curvature of the peduncle of Papaveraceae. (Ger). Ber. Deutsch. Bot. Ges. 1: 429-432. 451 D48.

Curvature is caused by internal factors and is not dependent on the weight of the bud.

0539. FURUSATO, K. 1940. Polyploid plants produced by colchicine. (Jap; summ. Eng). Bot. & Zool. 8(8): 1303-1311. 410 B65.

Tetraploid plants of _P_. _somniferum_ were among those produced.

0540. FURUYA, T., A. IKUTA, and K. SYONO. 1972. Alkaloids from callus tissue of _Papaver_ _somniferum_. Phytochemistry 11: 3041-3044. 450 P5622.

Norsanguinarine, sanguinarine and other alkaloids isolated or detected in callus tissue of _P_. _somniferum_.

0541. GAAKEER, J. 1961. Trials with poppy in 1960. (Dutch). Meded. Proefstat. Akker-Weideb. 50: 1-34. 64.9 W122.

Row spacing, earthing-up and various rates and dates of N application on the seed yield of 3 varieties of poppy were studied.

0542. GAAL, GY. 1968. Research and industrial utilization of natural organic poppy alkaloids. (Ger; summ. Hung and Rus). Acta Phys. Chim. Debrecina 14: 171-184. 510 D352.

A review article on the separation of different opium alkaloids and their conversion to useful compounds.

0543. GABRA, S. 1956. _Papaver_ species and opium through the ages. Bull. Inst. Egypte 37(1): 39-56. 515 Eg9.

From jewelry, paintings and papyrus texts there is evidence that the ancient Egyptians cultivated _P_. _somniferum_ for its capsules and _P_. _rhoeas_, which also grew wild in the marshes, for its petals. Opium was medically used in ancient times as a sedative and narcotic.

0544. GAGNEPAIN, F. 1939. Berberidacees, Lardizabalacees, Nympheacees, Papaveracees, etc. In H. Lecomte, Flore generale de l'Indo-Chine. Supplement to volume 1(2). 236 pp. SI: 581.959 F63.

Papaveraceae (p. 151) include *P. somniferum*.

0545. GAJEK, F. 1971. Fertilizing requirements of poppy. (Pol; summ. Eng and Rus). Pamietn. Pulawski, Prace Iung 49: 77-91. 64.9 In7.

In acid soils, highest yields are obtained by fertilizing with N, P and K supplemented by liming. In soils with a good P and K supply, N fertilizer has a great influence on the increase of seed and fat yields. In alluvial soil, yield is increased by P additions.

0546. GALE, J. S., and A. E. ARTHUR. 1972. Variation in wild populations of *Papaver dubium*. IV. A survey of variation. Heredity 28(1): 91-100. 443.8 H42.

Out of 18 characters investigated, 13 show genetic variation within the wild population. For some characters, particularly flowering time, genotype-environmental interaction is small.

0547. GALIANO, E. F., and V. H. HEYWOOD. 1960. Catalogo de plantas de la Provincia de Jaen. Jaen, Spain. 205 pp. SI: QK329 F36.

Papaveraceae (pp. 67-69) include *P. argemone*, *P. dubium*, *P. hybridum* and *P. rhoeas*.

0548. GARBOWSKI, L. 1918. Parasitic fungi collected in the province of Podolia (Russia) during the summer of 1915. (Fr). Bull. Soc. Mycol. France 33(3/4): 73-91. 451 P213.

Macrosporium somniferi was described as a new species on *P. somniferum* in USSR.

0549. GARBOWSKI, L., and H. JURASZKOWNA. 1933. Diseases of useful plants in the period 1926-1930. A summary of the reports of the Plant Protection Station. (Pol). Rozn. Ochrony Rosl., Sect. A 1: 97-235. 464.9 R59.

On *P. somniferum* in Poland: *Alternaria brassicae* var. *somniferum*, bacteriosis, *Cladosporium herbarum*, *Entyloma fuscum*, *Fusarium* sp., *Macrosporium commune* and *Peronsopora arborescens*.

0550. GAROLA, J. 1929. Potash requirements of the opium poppy. (Fr). Ann. Sci. Agron. 46(2): 169-175. 14 An75A.

P. somniferum requires a large amount of potash at the end of the vegetative stage.

0551. GAROLA, J. 1942. Observations on the culture of oil plants in Beauce. (Fr). Compt. Rend. Acad. Agric. France 28: 194-205. 14 P215Bc.

Fertilizer requirements for a limestone and a sandy-clay area.

0552. GAROLA, J., and R. CADIER. 1943. Observations on some new crops in Beauce. (Fr). Ann. Agron. (Paris), n.s. 13: 275-287. 14 An75A.

Light, soil, fertilizer, etc., were compared for the culture of sweet corn, poppy, sunflower and Jerusalem artichoke.

0553. GASIC, O., M. PERGAL, B. BELLA, and R. SEKULIC. 1970. Isolating of narcotics from waste products in opium processing. Bull. Sci., Cons. Acad. RSF Yougoslavie, Sect. A, 15(3-4): 80-81. Q1 A1A3.

A method for isolating narcotine in the laboratory from the industrial wastes of opium production.

0554. GASIC, O., and M. PERGAL. 1971. Opium alkaloids. (Serb). Tehnika (Belgrade) 26(1): 140-144. U. Calif. Libr., Berkeley.

Review of recent work on the alkaloids of opium.

0555. GASSNER, G. 1949. The influence of planting width on the infection of poppy by Helminthosporium papaveris Hennig. (Ger). Nachrichtenbl. Biol. Zentralanst. Braunschw. 1: 119-123. 442.9 B832.

The fungus is impeded, in some soils, by reasonably narrow spacing to ensure rapid and uniform growth of the crop.

0556. GASTINEL, ___. 1862. Monograph on opium from upper Egypt. (Fr). Mem. Inst. Egyptien 1862(1): 411-435. LC: DT43 I62.

Survey of opium in Egypt, including, cultivation of plants, characteristics of the opium, dosage of morphine and the preparation of pharmaceuticals.

0557. GATTONI, A. 1950. Determination of the origin of opium. (Ital). Boll. Chim.-Farm. 89(5): 178-181.

Turkish, Iranian and Indian opium was compared by microscopic examination, colorimetric determination of the meconidine, determination of the codeine and determination of morphine.

0558. GÄUMANN, E. 1923. Contribution to a monograph of the genus _Peronospora_ Corda. (Ger). Beitr. Kryptogamenfl. Schweiz 5(4): 1-360. 462 Q23.

Peronospora arborescens on _Papaver somniferum_ in England.

0559. GELIN, O., and N. SCHWANBOM. 1941. Results from the years poppy cultivation. (Swed). Lantmannen 25: 739-740. 11 L234.

A study of the number of open and closed capsules of five cultivars.

0560. GELIN, O. E. V., and N. SCHWANBOM. 1943. Studies on cultivation and breeding of poppy. (Swed; summ. Ger). Agri. Hort. Genet. 1: 34-56. 64.8 Ag8.

Comparison of a number of varieties.

0561. GENEST, K., and G. BELEC. 1967. The determination of laudanine in opium by direct densitometric thin-layer chromatography. (Summ. Fr). Can. J. Pharm. Sci. 2(2): 44-47. NIH.

The laudanine content in six opium samples of various origins was found to be from 0.09 to 0.17%.

0562. GENEST, K., and C. G. FARMILO. 1955. Microestimation of opium alkaloids in pharmaceuticals by paper chromatography. J. Amer. Pharm. Assoc. 48(5): 286-289. LC: RS1 A522.

A method of analysis for morphine, codeine, thebaine and papaverine in mixtures employing paper chromatographic separation followed by densitometric evaluation.

0563. GENEST, K., and C. G. FARMILO. 1963. The preparation of porphyroxine from opium. J. Pharm. & Pharmacol. 15(3): 197-201. FD.

Chemical isolation of the minor alkaloid, porphyroxine, from opium.

0564. GENTRY, H. S. 1942. Rio Mayo plants. A study of the flora and vegetation of the valley of the Rio Mayo, Sonoro. Publ. Carnegie Inst. Wash. 527: 1-328. SI: QK211 G33.

The Papaveraceae (pp. 115-116) include *P. somniferum*.

0565. GENTRY, H. S. 1946. Notes on the vegetation of Sierra Surotato in northern Sinaloa. Bull. Torrey Bot. Cl. 73(5): 451-462. 451 T63B.

In a discussion of the ecology of the region, it is noted that there are small illegal plantings of *P. somniferum*. The poppy is spring grown, often following wheat, and planted where it can be irrigated by mountain streams.

0566. GEORGHIOU, G. P. and C. PAPADOPOULOS. 1957. A second list of Cyprus fungi. Cyprus Dept. of Agric. Techn. Bull. 5: 1-38. 21.7 C99.

Entyloma fuscum, leaf smut, on *P. rhoeas*.

0567. GERECS, A. and B. ZSADON. 1965. Investigations on production of morphine from some native poppy capsules. (Hung; summ. Ger). Magyar Kem. Folyoirat 71(10): 424-427. 385 M272.

True morphine content is best determined by acidimetry since polarographic analysis gives values higher than the real content, due to phenolic constituents.

0568. GERICKE, S. 1942. Phosphate manuring of oil plants. (Ger). Forschungsdienst 13: 117-123. 241 D48F.

Optimum phosphate for poppy is 90 kg P_2O_5/ha.

0569. GERICKE, S. 1948. Effect of different growth factors on yield and oil content of poppy. (Ger). Z. Pflanzenernahr. Düngung Bodenk. 40(1): 19-35. 384 Z343A.

Fertilizers should be chosen for the soil and yields are best with a pH 6-6.5. Moisture and cold in early summer hinders development and drought, and heat in August favors seed ripening.

0570. GHISLENI, P. L. 1955. Contribution to the knowledge of the effects of ultrasonics on higher plants. (Ital; summ. Fr, Ger and Eng). Ann. Accad. Agric. Torino 98: 63-108. 16 T63.

Ultrasonics hastened and increased germination of *P. somniferum* var. *album*.

0571. GIACOPELLO, D., and V. DEULOFEU. 1966. The structure of muramine. Tetrahedon Lett. 25: 2859-2861. 385 T29.

0572. GILL, N. T. 1938. Viability of weed seeds at various stages of maturity. Ann. Appl. Biol. 25(3): 447-456. 442.8 An72.

Immature seeds of P. dubium germinated more readily than fully ripened ones due to the impermeability of the seedcoat of the latter.

0573. GIMON, J.-T. 1831. Essai sur l'opium retire du pavot somnifere cultive en France, et sur l'opium exotique. These No. 31. Paris. 18 pp.

Effect of opium on dogs and man.

0574. GINEITIS, S. 1962. Poppies. (Lith). Musu Sodai 5: 11. 80 M973.

Popular article on cultivation.

0575. GINSBURG, D. 1962. The opium alkaloids. Selected topics. 111 pp. John Wiley & Sons, Inc., New York. 389.1 G430.

The chemistry of morphine, codeine, papaverine and the thebaine alkaloids is discussed.

0576. GIZHITS'KA, Z. 1926. Fungi collected in the autumn of 1925 and spring and summer of 1926. (Ukr and Eng). Izv. Kievsk. Bot. Sada 4: 21-33. 451 K54.

Pleospora papaveracea on the stems of cultivated Papaver at Kiev, Ukraine.

0577. GIZHITS'KA, Z. (GIZHITSKAYA, Z. K.). 1928. Conidial stage of Pleospora papaveracea Sacc. (Rus). Dnevn. Vsesojuzn. S'ezda Bot. 1928: 172-173. 451 V96.

Culture of spores.

0578. GIZHITS'KA, Z. 1929. Materials to the mycoflora of Russia. (Ukr and Eng). Izv. Kievsk. Bot. Sada 9: 92-101. 451 K54.

Peronospora arborescens on the leaves of Papaver somniferum causing about 30% damage.

0579. GIZHITS'KA, Z. 1929. Materials for the mycoflora of the Ukranian SSR. (Ukr title; Eng text). Izv. Kievsk. Bot. Sada 10: 4-41. 451 K54.

Dendryphium pencillatum isolated from a pure culture of *Pleospora papaveracea*. (p. 38).

0580. GLADYSHEV, P. P., and M. I. GORYAEV. 1969. Analytical chromatography of opium alkaloids on SE-Sephedex C-25. I. Distribution of alkaloids between the ion exchanger and the eluting solution. (Rus). Izv. Akad. Nauk Kaz. SSR, Ser. Khim. 19(3): 50-57. 385 AL62.

An equation is presented reflecting the dependence of the distribution coefficient of the alkaloid on the parameters of the buffer solution and on the properties of the ion exchange resin and alkaloid.

0581. GLADYSHEV, P. P., M. I. GORYAEV, and A. N. BAÏGALIEVA. 1969. Analytical chromatography of opium alkaloids on SE-Sephedex C-25. II. Distribution of alkaloids between the ion exchanger and the eluting solution. (Rus). Izv. Akad. Nauk Kaz. SSR, Ser. Khim. 19(3): 57-65. 385 AL62.

The mechanism of adsorption of alkaloids on the ion exchanger is discussed.

0582. GLADYSHEV, P. P., M. I. GORYAEV, and I. Y. SADCHIKOV. 1968. Elution chromatography of some opium alkaloids on Sephadex LH-20 in water. (Rus). Izv. Akad. Nauk. Kaz. SSR, Ser. Khim. 18(6): 69-70. 385 AL62.

Separation of codeine, morphine, narcotine, thebaine and papaverine.

0583. GLEASON, H. A. 1952. The new Britton and Brown illustrated flora of the northeastern United States and adjacent Canada. II. The New York Botanical Garden, New York. 655 pp.

The Papaveraceae (pp. 195-199) include *P. somniferum*, *P. argemone*, *P. dubium* and *P. rhoeas*.

0584. GÖBELEZ, M. 1963. The mycoflora of Turkey. (Fr). Mycopath. Mycol. Appl. 19: 296-314. 450 M994.

Entyloma fuscum collected on *P. somniferum* and *P. commutatum*. (p. 306).

0585. GÖBELEZ, M. 1964. List of fungi of Turkey. II. (Fr). Mycopath. Mycol. Appl. 23: 47-67. 450 M994.

Curvularia geniculata and *Helminthosporium papaveris* were collected on *P. somniferum*.

0586. GÖBER, B., and S. PFEIFER. 1963. Fermentative oxidation of phenolic opium alkaloids. (Ger). Pharmazie 18(2): 146-149. LC: RS1 P673.

Narcotoline, laudanidine and laudanine were broken down by phenol oxidase from *P. somniferum* to a far greater extent than was morphine.

0587. GODAN, D. 1952. *Ptinus fur* L. on rape and poppy. (Ger). Z. Hyg. Zool. Schädlingsbekämpf 40: 289-296. 449.8 Z36.

Observations on the life history of *Ptinus fur*, a beetle which infests poppy seed.

0588. GODARD, ___. 1945. The ripening of the opium poppy and solar radiation. (Fr). Compt. Rend. Acad. Agric. Fr. 31: 47-49. 14 P215Bc.

A reduction in intensity of light by 50% caused a decrease in the weight of capsules, seeds and oil since the number of flowers were reduced.

0589. GODNEVA, M. T. 1958. Effect of gases present in the air on the accumulation of oil in poppy seeds. (Rus). Akad. Nauk Belorusskoi SSR, Inst. Biol. Biokh. Fiziol. Rast. pp. 152-159. 463.2 M66.

Accumulation of oil in seeds is greater in an atmosphere of high oxygen and lower in carbon dioxide.

0590. GOEPPERT, ___. 1850-1851. On a stable variety of poppy in which the anthers are transformed into carpels, (*Papaver officinale* beta *monstrosum* Goepp.). (Fr). Flore des Serres et des Jardins de l'Europe 6: 241-242, 245-246. 80 F662.

Detailed description of the morphology of an aberrant form of *P. somniferum* (*P. officinale*).

0591. GOETHE, C. M. 1952. In search of poppies. Golden Gard. 16: 14, 22. 80 G56.

Native habitats of various cultivated poppies.

0592. GOIAN, M. 1966. Contribution to the teratological flora of Banat. (Rum; summ. Rus and Eng). Lucr. Sti. Inst. Agron. Timis. 9: 447-456. S16 R8T5.

Teratology in 6 species of plants including _P. somniferum_.

0593. GOLKIEWICZ, W., L. JUSIAK, and E. SOCZEWINSKI. 1966. Chromatographic analysis of alkaloid extracts of corn poppy flowers (_Papaver rhoeas_). II. Column and thin-layer chromatography. (Pol; summ. Rus and Eng). Diss. Pharm. 18(5): 485-489. MAM: PO 257J.

Good separation of at least 14 different alkaloids.

0594. GOLOVIN, P. N. 1960. Powdery mildews parasitizing cultivated and useful wild plants. (Rus). Akad. Nauk SSSR, Moscow-Leningrad. 266 pp. 464.1 G58.

Erysiphe cichoracearum f. _papaveris_ on _P. somniferum_.

0595. GOLUBINSKII, I. N. 1951. The effect of the admixture of pollen from surrounding plants on the germination of a plant's pollen. (Rus). Dokl. Akad. Nauk SSSR 76: 591-592. 511 P444A.

Germination of pollen grains from a number of plants including _Papaver_ spp. increased greatly with the addition of pollen from neighboring plants of different species.

0596. GOMEZ, J. M. 1882. _Papaver somniferum_. An essay on its naturalization in Mexico. (Span). Naturaleza 6: 115-118. 516 M578.

Comparison of poppy plantings in various areas of Mexico showing effects of climate, fertilizer, and possible insect pests on the yield of opium.

0597. GONZALEZ DOMEZ, C., J. CABO TORRES, and M. DEL PILAR PARDO GARCIA. 1957. Possibility of the application of paper chromatography to the identification of alkaloidal drugs. I. Drugs included in the Spanish Pharmacopeia IX. (Span). Farmacognosia 17(45): 255-289. 396.8 F222.

0598. GOODE, G. H. 1926. Teratological poppies. J. Northamp. Nat. Hist. Soc. 23(185): 121-123. LC: QH1 N86.

Flower abnormalities in the field probably resulting from hybrids between _P. rhoeas_ and _P. dubium_.

0599. GORLENKO, M. V., and I. V. VOROMKEVICH. 1959. Organisms of bacterial diseases of tomatoes and of poppy. (Rus). Mikrobiologiia 18: 257-262. 448.3 M582.

Bacterium papavericola and B. papaverium on poppy.

0600. GOSS, W. L. 1937. Germination of flower seeds stored for ten years in the California state seed laboratory. Calif. Dept. Agric. Bull. 26: 326-333. 2 C12M.

Shirley poppy seed retained 58% of its viability after 10 years of storage in the laboratory.

0601. GOZEVA, N. 1953. Effects of cutting the capsules of poppy on the yield and quality of seed. (Macedonian; summ. Eng). Annu. Inst. Rech. Agron. Skopje 2: 137-140. 21.5 Sk52.

When capsules of P. somniferum are harvested immature for opium extraction, yields of seed and oil are only slightly less than when capsules are harvested mature.

0602. GRACZA, P. 1969. Effect of cytokinins on the development of the poppy capsule. (Hung; summ. Eng). Bot. Kozlem. 56(4): 263-267. 450 N85.

Treatment with kinetin and benzyladenine after flowering produced a narrow elongated capsule; benzimidazole inhibited capsule growth. Benzyladenine also produced larger seeds.

0603. GRACZA, P., and S. SARKANY. 1967. Developmental conditions in the endosperm tissue of poppy (Papaver somniferum L.) in connection with the accumulation of nutrients. (Hung; summ. Eng). Bot. Kozlem. 54(4): 247-252. 450 N85.

Detailed description of events during the development of the embryo sac and endosperm.

0604. GRACZA, P., and S. SARKANY. 1970. Organization and histogenetic correlations of the ovules of Papaver somniferum L. (Ger; summ. Eng). Acta Bot. Acad. Sci. Hung. 16(1/2): 37-57. 450 Ac823.

The formation of placentae, the initiation and determination of the ovules, the characteristics of their integuments and macrosporogenesis and macrogametogenesis were studied on a series of stained slides prepared from pistils of the poppy.

0605. GRACZA, P., and G. VERZAR. 1970. Effect of growth regulators on the development and alkaloid content of poppy capsules. Acta Agron. Acad. Sci. Hung. 19(3/4): 406-410. 19 Ac8.

Ten growth regulators were injected into capsules of the variety "SB-Morphine" 1-2 days after flowering. Seed size was smaller following benzyladenine, kinetin and IAA treatment, larger following GA or 6-methyl uracyl. Most treatments lowered morphine and codeine but some increased thebaine, papaverine and narcotine.

0606. GRACZA, P., and G. VERZAR-PETRI. 1970. After-effect of growth influencing substances on the development and the alkaloid contents of the seedlings of *Papaver somniferum* L. (Hung; summ. Eng). Bot. Kozlem. 57(4): 259-262. 450 N85.

Growth substances were injected into the growing poppy capsule, and their effect on the shape, size and alkaloid content of the capsule observed.

0607. GRÄNICHER, O. F. 1936. Uber die Bestimmung des Morphins in Opium. Rudolf Springer, Trossiugen, Germany. 186 pp. 396 G76.

Chemical and pharmaceutical methods for the determination of morphine in opium.

0608. GRAY, A. 1887. XV. Contributions to American botany. 1. Revision of some polypetalous genera and orders precursory to the Flora of North America. Proc. Amer. Acad. Arts Sci. 22: 270-306. 500 Am33.

Includes an improved arrangement of the North American genera of Papaveraceae.

0609. GREENFIELD, H., L. STEINIG, and J. DITTERT. 1968. International Narcotics Control Board, Geneva. First Report of the International Narcotics Control Board, November 1968, 24 pp. United Nations, New York. HV 5800 I52.

Review and assessment of information on the working of the international system of narcotics control -- Opium pp. 13-14, 18-19, 22.

0610. GREGER, J. 1923. Seeds and fruits of field weeds. III. Some poppy seeds. (Ger). Z. Untersuch. Nahrungs Genussmittel 45(3): 156-157. 384 Z39.

Seed coats of P. dubium, P. argemone and P. rhoeas are compared with P. somniferum.

0611. GRENKEVICH, N. I., and I. F. GRIBOVSKAYA. 1968. Copper content of medicinal plants from different areas of the USSR. (Rus). Rast. Resur. 4(4): 506-517. 450 R18.

Two varieties of P. somniferum grown in different areas showed no correlation between the copper content of the plant parts and the soil in which it was grown.

0612. GRESCHIK, V. 1890. Fungi of Hungary. (Fr). Rev. Mycol. (Toulouse) 12: 101-126. 450 R329.

Entyloma fuscum, leaf smut on Papaver somniferum. (p. 112).

0613. GRIEBEL, C. 1950. Confusion of tobacco seed (Nicotiana rustica L.) with poppy. (Ger). Z. Lebensmittel-Untersuch. -Forsch. 90: 109-112. 384 Z39.

Seed bought on the black market as poppy was actually tobacco seed which caused tobacco poisoning when used in cooking.

0614. GRIER, N. M. 1919. The poppies of Flanders fields. Nat. Study Rev. 15: 342-343. 409.6 N21.

P. rhoeas and a variety of P. somniferum are the weeds of the war-devastated areas.

0615. GRLIC, L. 1957. Determination of the origin of opium by means of ultraviolet absorption spectrophotometry. II. Direct spectrophotometric identification of opium originating from different countries. (Serb; summ. Eng). Acta Pharm. Jugosl. 7(4): 199-204. MAM.

By plotting extinction quotients it is possible to distinguish samples of opium from Mexico, Ecuador, Japan, Yugoslavia, Greece, and countries of Southeast Asia. On the other hand, opium from Turkey, India, Pakistan and Afghanistan showed high variation in their spectral characteristics so they could not be identified.

0616. GRLIC, L. 1961. A simple and rapid method for distinguishing opium of Mexican origin from the other types of opium. J. Criminal Law, Criminol. Police Sci. 52: 229-231. LC: HV6001 J63.

A spectrophotometric method is based on the high content of papaverine and the low content of thebaine in Mexican opium, which separates it from that of other countries.

0617. GROSS, S. and R. F. DAWSON. 1963. The biochemical transformation of the morphothebaine to the morphine ring system. Biochemistry 2(1): 186-188. 381 B523.

Labeled tyrosine fed to _P. orientale_ seedlings was incorporated into thebaine, oripavine and isothebaine.

0618. GROVER, I. S., and C. P. MALIK. 1969. Karyological studies in some _Papaver_ species. Genet. Iber. 21(1-2): 105-113. 443.8 G28.

Chromosome structure of _P. rhoeas_ and _P. somniferum_ was studied in detail.

0619. GROVER, N. 1965. Man and plants against pain. Econ. Bot. 19(2): 99-112. 450 EC7.

A survey of anodyne plants including the opium poppy which the author says is the most widely used analgesic of botanical origin. The first isolation of morphine is described.

0620. GRÜMMER, G. 1951. Contributions toward the specific analysis of susceptibility of _Papaver somniferum_ to _Helminthosporium papaveris_. I. (Ger). Züchter 21(10/11): 306-322. 442.8 Z8.

Inoculation experiments on cut leaves and whole plants showed that infection depends on the host's physiological predisposition. The metabolic products of the fungus contain substances toxic to _Papaver_ spp.

0621. GRÜMMER, G. 1952. Contributions toward the specific analysis of susceptibility of _Papaver somniferum_ to _Helminthosporium papaveris_. II. (Ger). Nachrichtenbl. Deutsch. Pflanzensch. n.s., 6: 32-36. 464.9 N11.

Attempts were made to lower the intensity of the fungus by growing poppy along with cover crops of beets, carrots and yellow clover.

0622. GRÜMMER, G. 1952. Contributions toward the specific analysis of susceptibility of Papaver somniferum to Helminthosporium papaveris. III. (Ger). Züchter 22(12): 366-373. 442.8 Z8.

Helminthosporium toxin which retards the germination and early root development of the opium poppy has been purified and its effect on some wild Papaver spp. is discussed.

0623. GRÜMMER, G. 1953. Effect of Alternaria infection of poppy capsules on the germination readiness of their seeds. (Ger). Flora (Jena) 140: 298-306. 450 F66.

The typical infection symptom of opium poppy by Alternaria brassicae var. somniferum is precocious germination of the unripe seeds within the capsule. This is attributed to the secretion by the fungus of metabolic products which stimulate germination.

0624. GRÜMMER, G. 1955. The relation between the protein metabolism of cultivated plants and their susceptibility to parasitic fungi. (Ger). Phytopath. Z. 24(1): 1-42. 464.8 P562.

Protein decomposition in the leaves of oil poppy increased the susceptibility to infection by Helminthosporium papaveris.

0625. GRÜMMER, G. 1955. The poppy. (Ger). A. Ziemsen Verlag., Wittenberg Lutherstadt. Neue Brehm-Bücherei 152: 1-40. 409 N392.

A review article of the poppy covering cultivation, taxonomy of the wild varieties, harvest of opium and its use.

0626. *GRUPCE, R. 1962. The effect of temperature on the germination of Papaver somniferum. (Macedonian; summ. Eng). Annu. Fac. Agric. Univ. Skopje, Agric. 1961-1962, 15: 247-258.

Seeds of white and blue poppies germinated at temperatures ranging from 1° to 30°C, being most rapid between 20°-25°C. Daily growth increment of seedlings was greater in the blue poppy (var. violescens) than in white poppies (var. alba).

0627. *GRUPCE, R. 1964. A contribution to the study on the depth of incision in opium poppy capsules. (Macedonian; summ. Eng). Annu. Fac. Agric. Univ. Skopje, Agric. 1963-1964. 17: 131-144.

Incisions about 1000 mu deep tapped the whole latex network; for maximum latex recovery several incisions are required.

0628. GRÜTZMANN, K. D., and H. B. SCHRÖTER. 1966. The transformation of thebaine in tissue cultures. (Ger). Abh. Deutsch. Akad. Wiss. Berlin, Kl. Chem. 3: 347. 509 D482.

Alkaloid free callus tissue cultures of _P_. _somniferum_ converted thebaine to codeine.

0629. GSTIRNER, F., and K. VOLLMER. 1949. Preparation of an alkaloid from poppy seed capsules. (Ger). Apotheker-Zeitung 61: 57-60. 396.8 Ap4.

Techniques for extraction and concentration of alkaloids from poppy capsules are discussed. From 15,000 capsules, 200 g of a morphine base were isolated.

0630. GUEDES, M. 1969. Homology of the stamen and carpel in _Papaver_ _orientale_ L. (Fr). Compt. Rend. Hebd. Seances Acad. Sci. 268(6): 926-929. 505 P21.

An isolated carpel coming from a stamen is considered to show the homology of these 2 organs.

0631. GUGGISBERG, A., M. HESSE, H. SCHMID, H. BÖHM, H. RÖNSCH, and K. MOTHES. 1967. On _Papaver_ _bracteatum_ Lindl. IV. Structure of alkaloid E. (Ger; summ. Eng). Helv. Chim. Acta 50(2): 621-624. 385 H36.

A new alkaloid of the rhoeadine type has been isolated and its structure determined.

0632. GUILLAUME, A., and J. FAURE. 1946. On the variation in morphine content in poppy capsules during the period of maturity and during storage. (Fr). Ann. Pharm. Franc. 1(1): 160-165. 396.8 An7.

Morphine content of green young capsules is higher than mature dried ones but storage decreases the content of green but not mature ones.

0633. GULIMOVA, T. E. 1965. Spectrophotometric quantitative determination of papaverine hydrochloride. (Rus; summ. Eng). Aptechn. Delo 14(6): 53-57. MAM.

Technique suggested for determining papaverine hydrochloride in tablets and ampules.

0634. GULUBOV, A., and A. VENKOV. 1969. Chromatographic method for extracting morphine base from opium. (Rus; summ. Fr). Vissh. Pedagog. Inst., Plovdiv, Mat. Fiz. Khim. Biol. 7(1): 133-136. State V. I. Lenin Libr. of USSR.

Method is very accurate.

0635. GUMPENSTEIN (KARNER, L.). 1955. Results of varietal and other trials with vegetables at Gumpenstein in the year 1953. (Ger). Versuchsergebn. Bundesversuchsanst. Alpenland. Landw. Gumpenstein 29: 1-25. 19 Ad6V.

Date of harvest of poppy seed is compared in 7 varieties with yield.

0636. GUMPENSTEIN (KARNER, L.). 1955. Results of varietal and other trials with vegetables at Gumpenstein in the year 1954. (Ger). Versuchsegebn. Bundesversuchsanst. Alpenland. Landw. Gumpenstein 30: 1-26. 19 Ad6V.

Seed yield of trials of 13 varieties of poppy are given. Dates of flowering, harvest and height of plant are included.

0637. GUMPENSTEIN (KARNER, L.). 1959. Results of variety trials with vegetables and other crops at Gumpenstein in the year 1959. (Ger). Versuchsergebn. Bundesversuchsanst. Alpenland. Landw. Gumpenstein 50: 1-103. 19 Ad6V.

Varieties of the oil poppy were tested under alpine conditions.

0638. GÜNTHER, K.-F., and H. BÖHM. 1968. Critical comments on _Papaver_ _bracteatum_ Lindl. (Ger). Osterr. Bot. Z. 115(1): 1-5. 450 Os7.

Calyx shape, pubescence and petal color are the important diagnostic characters which separate _P_. _bracteatum_ from _P_. _orientale_.

0639. GUPTA, D. K., B. T. R. IYENGAR, and M. M. CHAKRABARTY. 1957. Chromatographic separation of glycerides. Sci. & Cult. 22(7): 400-401. SI: 505.54 S41.

Analysis is given of a sample of Indian poppy seed oil.

0640. GUPTA, R. K. 1968. Flora Nainitalensis. Navayug Traders, New Delhi. 489 pp. SI: QK358 G97.

P. dubium is listed on p. 15.

0641. GURSKI, J. H., and K. MYSLAKOWSKI. 1931. Influence of thickness of covering on the germination of weed seeds. (Pol; summ. Fr). Doswaildczalnictwo Rolnicze 7: 56-64. 20.5 D74.

P. rhoeas was among those tested but germination was too poor to be conclusive.

0642. GUSTAVSSON, A. 1959. Studies on Nordic Peronosporas. I. Taxonomic revision. Opera Bot. 3(1): 1-271. 450 Op22.

In this taxonomic monograph, pp. 69-72 lists all the *Peronospora* species found on various *Papaver* spp. and gives their distribution.

0643. GUTMANSKI, I. 1964. The influence of interplanting of poppy and bean upon the yield of sugar beets. (Pol; summ. Rus, Eng and Fr). Biul. Inst. Hodowii Rosl. B 58(1/2): 151-157. 64.9 W26.

Yields of seeds obtained from both poppy and bean did not compensate the loss of sugar beet root and leaf.

0644. HAAS, H. 1961. Phytogenic drugs as remedies against central nervous and mental illnesses. (Ger; summ. Eng). Arzneimittel-Forsch. 4: 49-59. MAM.

P. somniferum is included among 75 plants valued historically as remedies against nervous and mental diseases. Few meet modern standards.

0645. HACKBARTH, J. 1944. Die Olpflanzen Mitteleuropas. (Monographien aus dem Gebiete der Fett-Chemie XV). Stuttgart. 378 pp.

A complete discussion of *P. somniferum* as an oil crop is given on pp. 96-123 including taxonomy, cultivation, diseases, yield and composition of the oil.

0646. HADZISTEVIC, D. 1955. The incidence of plant pests and diseases in the province of Serbia in 1953. (Croat; summ. Eng). Zast Bilja 27: 89-120. 464.8 Z1.

Peronospora arborescens causes serious damage to poppy.

0647. HAISLIP, M. P. 1955. Time to plant oriental poppies. Horticulture 33: 383, 390-391. 80 H783.

Best varieties with notes on their cultivation.

0648. HAIZEL, K. A. 1972. The productivity of mixtures of two and three species. J. Appl. Ecol. 9(2): 601-608. 410 J828.

Barley, white mustard and poppy (P. rhoeas) were grown in pure stand and in mixtures of two and three species. The yield of the mixtures did not exceed the highest yielding species in pure stand.

0649. HAKIM, R., and J. M. FUJIMOTO. 1970. Extraction of morphine enhanced by addition of N-methyl-3-piperidyl-(N'N')-diphenylcarbamate. J. Pharm. Sci. 59(12): 1783-1786. 396.8 J825.

0650. HAKIM, S. A. E., V. MIJOVIC, and J. WALKER. 1961. Distribution of certain poppy-fumaria alkaloids and a possible link with the incidence of glaucoma. Nature 189: 198-201. 472 N21.

Fifty-six species of poppy-fumaria weeds (including 16 Papaver species) were analyzed for berberine, coptisine, chelerythrine and sanguinarine. The possibility that these isoquinoline alkaloids might cause glaucoma is discussed.

0651. HALLIER, E. 1873. Deutschlands flora. Leipzig. 224 pp. SI: QK314 H18.

Papaveraceae (pp. 104-105) include P. alpinum, P. argemone, P. dubium, P. hybridum, and P. rhoeas.

0652. HAMLYN, B. M. G. 1953. Quantitative studies on the transmission of cabbage black ring spot virus by Myzus persicae. (Sulz.). Ann. Appl. Biol. 40(2): 393-402. 442.8 An72.

Fasted aphids acquired virus from infected plants in feeding times as short as 10 sec., and infected healthy plants in 5 sec. Among the plants that became infected were P. somniferum, P. rhoeas and P. nudicaule.

0653. HANELT, P. 1970. The typification of Papaver nudicaule L. and the systematic position of P. nudicaule Hort. non L. (Ger; summ. Eng and Rus). Kulturpflanze 18: 73-88. 450 K95.

The cultivated Iceland poppies are identified as P. croceum rather than P. nudicaule.

0654. HANELT, P. 1970. Revision of Mongolian taxa of Papaver L. Sect. Scapiflora Rchb. and studies on systematics and evolution of this section. (Ger). Biol. Rundschau 8(6): 408-409. 442.8 B5272.

0655. HARBORNE, J. B. 1963. Flavonoid sophorosides. (Summ. Ger). Experientia 19: 7-8. 475 Ex7.

The petals of 5 species including P. rhoeas were studied.

0656. HARBORNE, J. B. 1965. Plant polyphenols. XV. Flavonols as yellow flower pigments. Phytochemistry 4(5): 647-657. 450 P5622.

Quercetagetin 7-glucoside and nudicaulin were isolated from P. nudicaule.

0657. HARBORNE, J. B. 1969. Comparative biochemistry of the flavonoids. VIII. Gossypetin and herbacetin as taxonomic markers in higher plants. Phytochemistry 8(1): 177-183. 450 P5622.

Herbacetin is the principal flower pigment of Meconopsis paniculata and gossypetin in P. nudicaule. Since both flavonols are in widely scattered plant groups there is no taxonomic significance.

0658. HARPER, J. L. 1966. The reproductive biology of the British poppies. Bot. Soc. Brit. Isles, B.S.B.I. Conf. Rep. 1966: 26-39. 451 B658Br.

Study of the distribution of the 5 species, P. lecoqii, P. argemone, P. rhoeas, P. dubium and P. hybridum, and their ecological relationships with each other.

0659. HARPER, J. L., and I. H. MCNAUGHTON. 1960. The inheritance of dormancy in inter- and intraspecific hybrids of Papaver. Heredity 15: 315-320. 443.8 H42.

Hybrids between Papaver species lack seed dormancy which is usually pronounced in the parents.

0660. HARPER, J. L., and I. H. MCNAUGHTON. 1962. Interference in mixed poppy populations. Ann. Appl. Biol. 50(2): 352. 442.8 An72.

Five species of poppy occurring in mixed stands as arable weeds possess self-regulatory properties through density-induced mortality and plasticity.

0661. HARPER, J. L., and I. H. MCNAUGHTON. 1962. The comparative biology of closely related species living in the same area. VII. Interference between individuals in pure and mixed populations of *Papaver* species. New Phytol. 61(2): 175-188. 450 N42.

Garden plots of pure stands of *Papaver* species reacted to density by a reduction in plant weight and capsule number. In a mixture of 2 populations, the species in lower proportion gave the most successful establishment from seed.

0662. HARRINGTON, G. T. 1921. Optimum temperatures for flower seed germination. Bot. Gaz. 72(6): 337-358. 450 B652.

Germination of *P. somniferum*, *P. rhoeas* var. 'Shirley' and an unidentified species was best at 15°C. In general, seeds of *P. somniferum* were less sensitive to temperature than those of other species.

0663. HARRINGTON, H. D. 1954. Manual of the plants of Colorado. Denver. 666 pp. 455.83 H23.

Papaveraceae (pp. 252-253) include *P. nudicaule*.

0664. HARRISON, J. 1965. Thin layer chromatography of opium phenanthrene alkaloids. (Span). Bol. Soc. Quim. Peru 31(1): 31-35. 385 So15.

Qualitative determination of morphine, codeine and thebaine.

0665. HARRISON, W. C., and C. G. SCHMITT. 1967. Diseases of the opium poppy (*Papaver somniferum*): A check list. Dept. of Army, Crops Div., Biol. Sci. Lab., Fort Detrick, Misc. Publ. 27: 1-22. Stevenson Mycological Libr., SI.

A check list including references of 2 bacterial, 2 viral and more than 50 fungal diseases of poppy. Five species of nematodes are reported on poppy roots.

0666. HARTZELL, A. 1944. Further tests on plant products for insecticidal properties. Contrib. Boyce Thompson Inst. 13: 243-252. 451 B69.

In tests with mosquito larvae, acetone extracts of the flowers and stems of a *Papaver* species gave medium lethal doses.

0667. HARVEY, W. H., and O. W. SONDER. 1859-1860. Flora Capensis I. Dublin. 546 pp. 460.46 H26.

Papaveraceae (pp. 14-15) include *P. aculeatum*.

0668. HARVEY-GIBSON, R. J., and M. BRADLEY. 1916. Contributions towards a knowledge of the anatomy of the lower dicotyledons. I. The anatomy of the stem of the Papaveraceae. Trans. Roy. Soc. Edinburgh 51: 589-608. LC: Q41 E2.

The stem structure throughout the Papaveraceae is very uniform having a subepidermal band of chlorophyll-bearing tissue, a sclerotic pericycle and a massive pith.

0669. HASITSCHKA, G. 1956. Formation of chromosome bundles similar to salivary gland chromosomes, coiled chromosomes of resting nuclei, and other structural peculiarities in the endopolyploid giant nuclei of antipodal cells of *Papaver rhoeas*. (Ger). Chromosoma 8(2): 87-113. 442.8 C46.

Antipodal nuclei (n = 7) grow to giant size by endomitotic division reaching 64- to 128-ploidy.

0670. HAUDUROY, P., G. EHRINGER, A. URBAIN, G. GUILLOT and J. MOGROU. 1937. Dictionnaire des Bacteries pathogenes. Masson et Cie. Editeurs, Paris. 597 pp. 448.2 H293.

Erwinia papaveris on *P. rhoeas* and *Phytomonas papavericola* on *Papaver rhoeas* and *P. orientale*.

0671. HAUMAN, L. and L. R. PARODI. 1921. Plant parasites of cultivated plants in Argentina. (Span). Revista Fac. Agron. Veterin. Ser. III, 3: 227-274. 9 B863.

Erysiphe polgoni on *P. somniferum*.

0672. HAUMAN-MERCK, L. 1915. Vegetative parasites of plants cultivated in Argentina and in adjacent regions. (Fr). Anales. Mus. Nac. Hist. Nat. Buenos Aires, 26: 163-225.

Erysiphe polygoni DC., powdery mildew on *P. somniferum* in Argentina.

0673. HAUSTVEIT, G., and J. K. WOLD. 1970. Higher-carbon sugars of opium poppy (Papaver somniferum L.). Acta Chem. Scand. 28(8): 3059-3061. 385 Ac82.

Confirms the presence of altro-heptulose (sedoheptulose) and manno-heptulose and describes and characterizes D-glycero-D-manno-octulose in poppy capsules.

0674. HAYEK, A. 1924. (1927). Prodromus florae Peninsulae Balcanicae. Repert. Spec. Nov. Regni. Veg. Beih. 30(1): 1-1191. SI: QK332 H417.

There are 16 species of Papaver including P. somniferum and P. setigerum in Papaveraceae (pp. 351-369).

0675. HAYTER, A. 1968. Opium and the romantic imagination. Univ. of Calif. Press, Berkeley, Calif. 388 pp. LC: PN751 H3.

Mainly the effects of opium and laudanum upon works of artists, poets, etc.

0676. HECKEL, J. E. 1919. Modern paint vehicles. Amer. J. Pharm. 91: 287-297. 396.8 Am3.

Various vegetable oils, including poppy seed oil, are compared for possible use in paint.

0677. HEEGER, E. F. 1939. Varietal studies for opium production in Germany. (Ger). Forschungsdienst 8: 508-514. 241 D48F.

Studies in Germany show that morphine content is a hereditary factor that depends on soil and climate for optimum production.

0678. HEEGER, E. F. 1957. The harvest of poppies with regard to the yield from empty capsules of chaff. (Ger). Mitschurin Bewagung 6(14): 661-664. 18 M695.

The alkaloid content decreases as the pedicel elongates.

0679. HEEGER, E. F., and K. H. BAUER. 1940. Investigations on the morphine content of commercial and other poppy varieties and the possibility of opium production in Germany. (Ger). Landw. Jahrb. 90: 397-429. 18 L23.

Seed color can be correlated with morphine content, blue seeded varieties are higher than white; there is also a correlation with shape of the capsule. Morphine varies greatly with climate, increasing in warm dry summers and decreasing in wet ones.

0680. HEEGER, E. F., and W. POETHKE. 1947. _Papaver somniferum_ L., the poppy. (Ger). Pharmazie 4 Beih. 1 Erganzungsband pp. 235-240. 396 H364.

Cultivation of poppies and their use in pharmacy. Seed of _P. somniferum_, _P. rhoeas_, _P. hybridum_, _P. dubium_ and _P. argemone_ are compared.

0681. *HEEGER, E. F., and W. POETHKE. 1948. The poppy. Cultivation, chemistry, use. (Ger). 2nd Ed. W. Saenger, Berlin. 105 pp.

Botany, origin and geographic distribution, edaphic and climatic requirements, best varieties for cultivation for pharmaceutical purposes, methods of cultivation, harvesting opium, yields, diseases and pests and their control are discussed.

0682. HEEGER, E. F., and H. SCHRÖDER. 1959. Investigation of the morphine yield of _Papaver somniferum_ L. under Central German cultivation conditions. (Ger). Pharmazie 14(4): 228-233. LC: RS1 P673.

Relationship of plant mass and morphine was studied under varying agricultural conditions. Morphine content was highest during the period 10-30 days after flowering.

0683. HEGNAUER, R. 1961. The classification of the Rhoeadales _sensu_ Wettstein with regard to their components. (Ger; summ. Eng). Pl. Med. 9(1): 37-46. 450 P697.

The delimitation and hypothetical relationships of the Rhoeadales is discussed from a biochemical point of view.

0684. HEINZE, K. 1952. Virus transmission experiments with aphids on dahlias, cucumber, onions, turnips and some other plants. (Ger; summ. Eng). Z. Pflanzenkrankh. 59: 3-13. 464.8 Z3.

Doralis (_Aphis_) _fabae_ and _Myzus persicae_ normally feed on poppy and are vectors of poppy mosaic which causes mottling of the leaves.

0685. HEMMI, T. 1920. Contribution to the knowledge of the morphology and physiology of _Gloeosporium_ in Japan. (Ger). J. Fac. Agric. Hokkaido Univ. 9(1): 1-159. 107.6 J273J.

Gloeosporium sp. caused spots on _P. somniferum_ in Japan.

0686. HEMMI, T. 1921. Supplements to the knowledge of *Gloeosporium*. (Ger). J. Fac. Agric. Hokkaido Univ. 9: 305-346. 107.6 J273J.

Gloeosporium sp. on *P. somniferum*.

0687. HEMMI, T., and T. NOJIMA. 1927. Contribution to the knowledge of anthracnoses of plants. I. Notes on three new or little known anthracnoses of the cultivated plants in Japan. Mem. Coll. Agric. Kyoto Univ. 3(2): 26-39. 107.6 K994.

The causal fungus of poppy anthracnose is identical with a form of *Gloeosporium* which causes the typical bitter-rot of apples.

0688. HENNINGS, P. 1903. Japanese fungi. (Ger). Bot. Jahrb. Syst. 32: 34-46. 450 En3B.

Peronospora arborescens was collected on *Papaver somniferum* in Japan.

0689. HENRIKSEN, K. 1970. Trials with varieties of opium poppies 1965-1969. (Dan; summ. Eng). Tidsskr. Planteavl 74: 475-480. 11 T439.

Svalof Flora II and Marianne gave best results of five new varieties field tested for yield of seed and the content of crude fat and protein.

0690. HENRY, T. A. 1949. The plant alkaloids. 4th ed. J. & A. Churchill Ltd., London. 804 pp.

A technical chemical discussion of the opium alkaloids of Papaveraceae is given (pp. 175-274).

0691. HERISSET, A. 1967. Evolution of the cultivation of the opium poppy in Anjou. (Fr). Pl. Med. Phytother. 1(1): 35-41. MAM.

Breeding experiments were conducted with 8 varieties for higher morphine content. Early flowering is associated with a high alkaloid level.

0692. HESS, H. E., E. LANDOLT, and R. HIRZEL. 1970. Flora der Schweiz, Vol. 2. Birkhauser, Basel and Stuttgart. 956 pp. QK331 H4.

Family is characterized on pp. 107-116, with keys to 4 genera and their species. Eleven species of *Papaver* are described and at least partially illustrated.

0693. HESSE, O. 1871. Chemical studies on the alkaloids of opium. (Ger). Ber. Deutsch. Chem. Gesell. 4: 693-697. 384 B45.

Chemical characterizations of the alkaloids found in opium.

0694. HEUSER, W. 1941. Poppy growing in the lower Danube area. (Ger). Wien. Landw. Ztg. 91: 28. 17 W63.

Deep, warm, moderately moist, medium heavy soils, well cultivated and limed will meet the requirements of poppy plants in the lower Danube area. Seed should be sown in shallow furrows at a rate of 4-6 kg/ha.

0695. HEYDENREICH, K., R. MIRAM, and S. PFEIFER. 1961. The alkaloid metabolism of Papaver somniferum L. (Ger). Sci. Pharm. 29(4): 221-249. MAM.

A very complete study of P. somniferum thoroughly analyzing various parts of the plant for 6 alkaloids during 12 stages of development.

0696. HEYDENREICH, K., and S. PFEIFER. 1962. Alkaloid metabolism in Papaver somniferum L. IV. Alkaloid distribution in decapitated plants. (Ger). Sci. Pharm. 30(1): 17-25. MAM.

Decapitated plants accumulate much more thebaine than normal plants.

0697. HEYDENREICH, K., and S. PFEIFER. 1962. The metabolism of alkaloids in Papaver somniferum L. V. Diurnal fluctuations in the alkaloid content. (Ger). Sci. Pharm. 30(3): 164-173. MAM.

The 6 alkaloids studied (morphine, codeine, thebaine, narcotine, narcotoline and papaverine) were found in all plant organs at all developmental stages, accumulating until the end of flowering. The absolute quantities were highest during the night and morning and only narcotine continued to accumulate until midday.

0698. HEYDENREICH, K., and S. PFEIFER. 1965. Alkaloids of Papaver. IX. Bractavine, a new Papaver alkaloid. (Ger). Pharmazie 20: 521. LC: RS1 P673.

Isolated from P. bracteatum and P. orientale.

0699. HEYDENREICH, K., and S. PFEIFER. 1966. Alkaloids of the genus Papaver. XI. Isolation of (-)-orientalinone, salutaridine and oreophiline from Papaver bracteatum Lindl. (Ger). Pharmazie 21: 121-122. RS1 P673.

0700. HEYDENREICH, K., and S. PFEIFER. 1967. Alkaloids of the genus Papaver. XXI. Bracteoline, a new aporphine alkaloid. (Ger). Pharmazie 22(2): 124-125. RS1 P673.

Isothebaine, (-)-orientalinone, salutaridine and a new alkaloid bracteoline were isolated from semi-ripe capsules of P. bracteatum.

0701. HEYNE, K. 1927. Die nuttige planten van Nederlandsch Indie. Vol. I. Batavia. 732 pp. SI: QK367 B97.

Papaveraceae (pp. 675-676) include P. somniferum.

0702. HILDITCH, T. P., and H. JASPERSON. 1939. The constitution of the linoleic acid of seed fats. J. Soc. Chem. Ind. 58: 233-241. 382 M31.

Chemical composition of the linoleic acid present in linseed, cottonseed, soya bean, poppy seed and groundnut oils.

0703. HILLS, K. L. 1945. Changes in the morphine and dry matter content of the opium poppy (Papaver somniferum) during the maturation period. J. Council Sci. Res. Australia 18(4): 286-297. 514 Au72J.

Although the dry matter of the husks and stems decreased as the plant matured, the morphine did not vary. Since the upper half of the stem contains all the morphine but only 20% of the dry matter, it is suggested only that part be harvested when the capsules are dry.

0704. HILLS, K. L. 1946. The suitability of a number of varieties of opium poppy for the production of morphine from the ripe capsule. J. Council Sci. Res. Australia 19: 177-186. 514 Au72J.

Forty-four varieties were compared and those best adapted to conditions in southern Australia and to extraction of morphine from straw were crossed in an effort to combine desirable characters.

0705. HILLS, K. L., and C. N. RODWELL. 1950. The recombination of some varietal characters in the opium poppy. Austral. J. Agr. Res. 1: 118-131. 23 Au783.

Desirable agronomic characters can be combined in one variety by hybridization providing parents are compatible.

0706. HIRATA, K. 1955. Comparison of powdery mildews and their hosts of Japan and the United States of America. Bull. Fac. Agric. Niigata Univ. 30(5): 146-152. 22.5 N573.

Erysiphe polygoni occurs on *P. somniferum* in the United States but not in Japan.

0707. HIROSI, O. 1960. Results of experiments on the vernalization of medicinal and oil plants. (Rus). Agrobiologija 3: 427-439. 20 Ag822.

Seed vernalization at 2°-6°C increased the alkaloid content of *P. somniferum* by 26%.

0708. HIROSI, T. 1923. Plant breeding experiments with the opium poppy. (Jap). Rep. Imp. Hyg. Lab. 19: 289-327. Libr. Min. Agric. Forest., Tokyo, Japan.

Several lines with distinct characteristics of size and form of capsule, maturation, etc. were crossed. Heterosis in the hybrids was significant.

0709. HIRZEL, H. 1851. Das Opium und seine Bestandtheile (Opium and its constituents). Wilhelm Baensch, Leipzig. 48 pp. MAM.

Chemical composition of the alkaloids.

0710. HLAVACKOVA, Z. 1955. Poppy breeding for increased morphine content. (Czech; summ. Rus and Ger). Preslia 27: 368-382. 450 P92.

Under Czechoslovakian conditions the Dutch variety, Nordster, contained the highest amount of morphine, while Bulgarian varieties had relatively low amounts.

0711. HLAVACKOVA, Z. 1959. Crossing of poppies aimed at a heightening of the morphine content in dry poppy-heads. (Czech; summ. Rus and Eng). Rostl. Vyroba 32(4): 521-536. 64.9 C33.

Heterosis occurred in F_1 seed weight and plant height. Morphine content was intermediate between the parents.

0712. HLAVACKOVA, Z. 1962. Correlations among the characters important for breeding in four poppy varieties. (Czech; summ. Rus, Eng and Ger). Sborn. Ceskoslav. Akad. Zemed. Ved. Rostl. Vyroba 35(3): 378-388. 64.9 C33.

Four poppy varieties were studied for weight of seed, height of plant, number of rays in the stigma, height/width ratio of the capsule, branching and percentage of morphine in dry capsules.

0713. HLAVACKOVA, Z. 1972. Investigation of the inheritance of plant height and seed weight in poppy (Papaver somniferum L.). (Czech; summ. Eng, Rus and Ger). Genet. Slecht. (Praha) 8(2): 87-93. QH431 A1S25.

The two varieties studied showed a high heritability in plant height and a low one in seed weight.

0714. HOCKING, B. 1968. Insect-flower associations in the high Arctic with special reference to nectar. (Summ. Rus). Oikos 19(2): 359-387. 410 Oi4.

P. radicatum flowers focus sunlight falling on them in the region of the germ cell; the thermal increments obtained by black insects resting on these flowers is important.

0715. HOCKING, B., and C. D. SHARPLIN. 1965. Flower basking by Arctic insects. Nature 206: 215. 472 N21.

Flowers of P. radicatum had an interior temperature up to 5.5°C higher than the surrounding air temperature and may account for the basking habit of insects observed on the Ellesmere Islands.

0716. HODKOVA, J., Z. VESLEY, Z. KOBLICOVA, J. HOLUBEK, and J. TROJANEK. 1972. On alkaloids. XXV. Minor alkaloids by poppy capsules. Lloydia 35(1): 61-68. 442.8 L77.

Mother liquors from the commercial isolation of morphine from poppy capsules were subjected to column chromatography and the minor alkaloids separated.

0717. HOEHNE, F. C. 1939. Plantas e substancias vegetais toxicas e medicinais. Sao Paulo, Brazil. 355 pp.

Uses of opium and morphine in medicine. Other Papaveraceae of medicinal interest are mentioned.

0718. HOLLINGS, M. 1957. Anemone mosaic - A virus disease. Ann. Appl. Biol. 45(1): 44-61. 442.8 An72.

P. rhoeas is usually a symptomless systemic carrier of the virus, but a few plants showed slight leaf chlorosis. In P. somniferum there is a reduction of vigor when the plants are grown at 18°C but there is severe dwarfing and necrosis of leaves at 8°-10°C.

0719. HOLLINGS, M. 1962. Studies of pelargonium leaf curl virus. I. Host range, transmission and properties in vitro. Ann. Appl. Biol. 50: 189-202. 442.8 An72.

The virus multiplied without symptoms in inoculated leaves of P. somniferum.

0720. HOLLO, J., I. ZAGYVAI, and L. KOCH. 1966. Fiber-free green forage extracts having a complete biological value. (Fr). Fr. 1,463,049 (Cl. A 23k) 6 pp. U.S. Patent Office.

A French patent for preparing a fiber-free green forage extract having a complete biological value and stability on storage from young raw vegetable material including poppy.

0721. HOLLOWAY, P. J. 1969. Chemistry of leaf waxes in relation to wetting. J. Sci. Food Agric. 20(2): 124-128. 382 So12.

Secondary alcohols are the major constituents of poppy wax.

0722. HOLLOWAY, P. J. 1969. The effects of superficial wax on leaf wettability. Ann. Appl. Biol. 63(1): 145-153. 442.8 An72.

In _P_. _somniferum_, wax is the dominant factor governing water repellency.

0723. HOLUBEK, J., S. KUDRNAC, and M. NOVAK. 1958. The determination of codeine, narcotine and thebaine in opium poppy capsules. (Ger). Pharmazie 13(2): 95-99. LC: RS1 P673.

Chromatographic separation.

0724. HONECKER, H. C., and H. COPER. 1970. Thin-layer chromatographic demonstration of opium as an admixture to marihuana. (Ger; summ. Eng and Span). Deutsche Med. Wochenschr. 95(42): 2129-2131. 448.8 D48.

The presence of opium in a sample of marihuana can be quickly and reliably demonstrated by thin-layer chromatography.

0725. HONEYMAN, J. M. 1956. On the occurrence of cyanogenetic glycosides in the order Rhoeadales. Taxon 5: 33-34. 450 T192.

Of the 10 genera and 34 species of Papaveroideae tested, only _Eschscholtzia_ _californica_ showed positive evidence of the presence of the glycoside.

0726. HOOKER, J. D. 1875. The flora of British India. Vol. I. L. Reeve & Co., London. 740 pp. SI: QKB58 H78.

The Papaveraceae are given on pp. 116-119 and include _P_. _nudicaule_, _P_. _hybridum_, _P_. _rhoeas_ and _P_. _dubium_.

0727. HOOPER, D. 1929. On Chinese medicine: Drugs of Chinese pharmacies in Malaya. Gard. Bull. Straits Settlem. 6(1): 1-474. 22.5 St8.

Among the plants listed is _P_. _somniferum_ which was not grown in China until the middle of the nineteenth century.

0728. HORAK, P., J. HOLUBEK, V. BUMBA, and Z. CEKAN. 1962. Method of separation of natural substances. V. Analysis of morphine in extracts from poppy capsules. (Ger; summ. Rus). Collect. Czech. Chem. Commun. 27: 1037-1942. 385 C68.

Separation of the alkaloids by electrophoresis.

0729. HORN, K. 1938. Chromosome numbers in Scandinavian _Papaver_ species. Avh. Norske Vidensk.-Akad. Oslo Ser. I, Mat.-Naturvidensk. Kl 1938(5): 1-13. LC: AS283 053.

The chromosome numbers support the taxonomic conclusions of Nordhagen and are evidence in favor of distinguishing _P_. _lapponicum_ and _P_. _laestadianum_ as separate species.

0730. HORWITZ, B. 1930. Researches on _Papaver_ _somniferum_ L. (Pol; summ. Ger). Mem. Inst. Nation. Polonais Econ. Rur. Pulawy 11(1): 159-217. 20.5 P19.

The 36 pure line cultivars studied had characteristic capsules and seeds. Plant height varied little but there were differences in branching. White flowers produced white, cream or chocolate colored seeds. Flowers from blue-seeded varieties were lilac, violet, red or purple-colored.

0731. HOSIE, A. 1906. The opium trade of China. Pharm. J. 1906: 512-513. 396.8 P49.

The import of foreign opium into China between 1895-1905 decreased due to an increased consumption of the native drug.

0732. HOSIE, A. 1910. Manchuria, its people, resources and recent history. J. B. Millet Co., Boston and Tokyo. 320 pp. LC: DS782 H83.

Cultivation of poppy in Manchuria is mentioned on pp. 86-87.

0733. HOSSAINI, A. A. 1968. Hemolytic and hemagglutinating activities of 222 plants. Vox. Sang. 15(6): 410-417. MAM.

Saline extracts of *P. orientale* (Princess Victoria Louise scarlet) seeds agglutinated red cells in the presence of the enzyme bromelin.

0734. HRBEK, J., JR., F. SANTAVY and L. DOLEJS. 1970. Isolation and chemistry of the alkaloids from some plants of the genus *Papaver*. LIII. On the structure of 14-demethoxyrhoeadine. Collect. Czech. Chem. Commun. 35(12): 3712-3720. 385 C68.

0735. HRISHI, N. J. 1960. Cytogenetical studies on *Papaver somniferum* L. and *Papaver setigerum* DC. and their hybrid. Genetica 31(1-2): 1-130. 442.8 G282.

After a comprehensive study of the genetics, cytology and morphology of the hybrids, it is concluded that *P. setigerum* is one of the allotetraploids of *P. somniferum* and that the latter species perhaps has evolved from species hybrids.

0736. HRISHI, N. J. and K. HRISHI. 1960. Studies on the correlation between male sterility and flower colour in F_2 of an interspecific cross between *Papaver setigerum* and *P. somniferum*. Genetica 31(5-6): 410-419. 442.8 G282.

In F_2 progenies there is a correlation between male sterility and flower color. Red and light purple flowered forms tend to have higher sterility than reddish purple and purple.

0737. HRUBY, J. 1929. Contributions to the fungus flora of Moravia and Silesia. (Ger). Hedwigia 69(3/4): 173-213. 450 H35.

Peronospora arborescens found on *Papaver dubium*, *P. rhoeas* and *P. somniferum* in Germany.

0738. HUANG, J. T., H. C. HSIU, and K. T. WANG. 1967. Polyamide layer chromatography of opium alkaloids. J. Chromatogr. 29(2): 391-392. 475 J824.

Separation of 7 opium alkaloids is described.

0739. HUGHES, D. W. 1966. Opium alkaloids related to porphyroxine. Lloydia 29: 379. 442.8 L77.

0740. HUGHES, D. W., and C. G. FARMILO. 1965. The preparation of O-methylporphyroxine and its detection in opium. J. Pharm. Pharmacol. 17(11): 757-758. MAM.

0741. HUGHES, D. W., L. KÜHN, and S. PFEIFER. 1967. The isolation and structure of papaverrubine C (Epiporphyroxine). J. Chem. Soc. (C) 1967(6): 444-446. QD241 C5.

Papaverrubine C has been isolated from opium and *P. caucasicum*.

0742. HULTEN, E. 1928. Flora of Kamtchatka and the adjacent islands. Kongl. Svenska Vetenskapsakad. Handl. 5(2): 1-175. 502 St6H.

Papaveraceae (pp. 138-145) include *P. nudicaule*, *P. alboroseum*, *P. microcarpum* and numerous subspecies and varieties.

0743. HULTEN, E., and K. FAEGRI. 1958. Var Svenska flora I. Farg. Vol. I. Stockholm. 380 pp. SI: QK327 H97.

Papaveraceae (pp. 215-221) include *P. rhoeas*, *P. dubium*, *P. argemone*, *P. radicatum* and *P. somniferum*.

0744. HUME, H. H. 1899. Fungi collected in Colorado, Wyoming and Nebraska in 1895, 1896 and 1897. Proc. Davenport Acad. Nat. Sci. 7: 246-300. 500 D27P.

Peronospora corydalis on the leaves of *Argemone platyceras* in Colorado. This was incorrectly identified and is actually *P. arborescens*, the first report of this fungus in the U.S.

0745. HUPP, E. 1948. Spring planted oriental poppies. Back to Eden 14(10): 3. 80 B12.

Popular article on spring planting.

0746. HURST, C. C. 1907. Mendelian characters in plants and animals. Int. Conf. Genet., 3rd Rept., Roy. Hort. Soc. pp. 114-128. 442.9 In8203.

In *P. somniferum* colored petals are dominant over white, purple flowers over red and black basal area of the petal over white.

0747. HURST, C. C. 1910. Mendelian characters in plants, animals and man. Verh. Naturf. Vereins Brunn. 49: 192-213. 510 B83.

Characters that have been studied in poppy include height of plant, color and pattern of the petals and doubleness of the flower.

0748. HUTCHINSON, J. 1925. Contributions towards a phylogenetic classification of flowering plants: V. The genera of Papaveraceae. Kew Bull. 1925(4): 161-168. 451 K51B.

A radical classification with keys to tribes and genera; suggests a phylogeny originating from forms with few stamens.

0749. HYDE, H. A., and K. F. ADAMS. 1958. An atlas of airborne pollen grains. MacMillan & Co., Ltd., London. 112 pp. 463.46 H99.

Description of pollen grains of P. rhoeas is given on p. 65.

0750. IBARRA CORRALES, C. 1950. Industrial extraction of morphine and codeine from the ripe capsules of Papaver somniferum. (Span). Farmacia Chilena 24: 501-502. MAM: W1 FA718.

0751. IDETA, A. 1911. Handbook of the plant diseases of Japan. (Jap). Tokyo. 316 pp.

Peronospora arborescens on Papaver somniferum (p. 168).

0752. IGNATIEVA, I. P. 1956. Propagation of oriental poppies (Papaver orientale) with root cuttings. (Rus). Sad & Ogorod 6: 73-74. 80 Sa13.

0753. IGNATIEVA, I. P. 1961. Some peculiar features of the ontogenesis of Papaver orientale L. (Rus; summ. Eng). Bot. Zhurn. SSSR 46(9): 1255-1270. 451 R923.

Growth rate of P. orientale is variable at 1-2 years and at 5-6 years when necrosis of tissue begins. This necrosis can be localized by formation of periderms on the inner surface of cavities, prolonging the life of the plant to 8-10 years.

0754. IGNATIEVA, I. P. 1966. Causes of the "degeneration" of some decorative herbaceous perennials. (Rus). Bot. Zhurn. SSSR 51(3): 426-430. 451 R923.

Plants of P. orientale live 5-10 years and should be replaced after 4-6 years.

0755. IGNATIEVA, I. P. 1969. The life cycle of the mountain poppy. (Rus). Moscow Timiryagevskaya Sel'skokhoz Akad. Dokl. Tskha 147: 273-279. LC: 20 M857.

P. oreophilum.

0756. IKRAM, M., G. A. MIANA, and M. ISLAM. 1963. Chromatographic separation of Rauwolfia serpentina and opium alkaloids on thin layers of alumina. J. Chromatogr. 11(2): 260-263. 475 J824.

Separation of morphine, codeine, papaverine and narcotine in various solvents.

0757. IKRAM, M., M. RAFIULLAH, A. DURRANI, M. I. KHAN, and M. B. ZAMAN. 1968. Alkaloidal composition of opium obtained with successive lancings. Pakistan J. Sci. Industr. Res. 11(3): 255-257. 475 P174.

Morphine and codeine are maximum in the third lancing of capsule; narcotine and papaverine, at the fifth to seventh lancing; thebaine shows a gradual increase. Analyses of the opium left in the capsule show the individual alkaloids are maximum after the second lancing and become nil after the third.

0758. ILIENA, G. M. 1961. Embrological investigations of Papaver somniferum L. (Rus; summ. Eng). Bjull. Moskovsk Obsc. Isp. Prir. Otd. Biol. 66(4): 13-25. 511 M85.

In the anaphase of meiosis some of the chromosomes lag, which probably indicated that P. somniferum is of hybrid origin. Fertilization takes place 48 hours after pollination and the zygote begins to divide at the 4-nuclear endosperm stage.

0759. *ILIEV, L. 1969. Isolation of morphine by perforation of a poppy capsule extract obtained by electric discharge in liquid medium. I. Extraction of morphine from the raw material with water. (Bulg). Farmatsiya (Sofia) 19(4): 16-21. MAM: W1 FA891A.

Extraction of morphine from opium poppy capsules using thin-paper chromatography showed the presence of traces of codeine and narcotine.

0760. ILIEV, L. 1970. Isolation of morphine by perforation of an extract from capsules of poppy, obtained by electric discharge of liquid medium. II. Consecutive extraction of morphine from the drug using water and the extract. (Rus; summ. Eng). Farmatsiya (Sofia) 20(1): 1-4. MAM: W1 FA891A.

Thin-layer chromatography extracted morphine, traces of codeine, slight traces of narcotine and some unidentified substances.

0761. ILIEV, L., and S. DALEV. 1967. A contribution to the characterization of the Bulgarian opium. (Bulg; summ. Rus and Eng). Farmatsiya (Sofia) 17: 10-14. MAM: W1 FA891A.

Bulgarian opium has some chemical characteristics which may be used to determine its origin.

0762. IL'INA, G. M. 1962. The phenology of embryogenesis in opium poppy (Papaver somniferum L.). (Rus). Nauchn. Dokl. Vysshei Shkoly. Biol. Nauk 1: 116-118. 442.8 N22.

During the 4 days preceeding blooming the opening flower shifts position 180° thus straightening the bent peduncle. Meiosis occurs in the ovules in the original bent position, at an intermediate position embryo sacs with 8 nuclei and 3-celled pollen can be observed, and when the flower has almost straightened, pollination takes place.

0763. ILINSKAYA, T. N., and M. G. YOSIFOVA. 1956. Influence of the conditions under which the poppy is grown on the alkaloid content of the opium obtained. Bull. Narc. 8(3): 38-41. LC: HV5800 B8.

In a survey of 3 varieties grown in various districts of the USSR, the percentage content of the 5 main alkaloids varied according to soil and climatic conditions. The morphine decreased from south to north according to latitude and the lower northern temperature promoted the formation of codeine.

0764. IMAM, S. M. 1964. Observations and studies on the morphine content of opium from Papaver somniferum cultivated under Abbottabad climate. Pakistan J. Forest. 14(3): 182-189. 99.8 P17.

Crude opium from the first 3 or 4 lancings should be separated for medical use since it contains a higher percentage of morphine.

0765. *INCEKARA, F. 1949. Turkish poppy varieties and their value with respect to seed and opium. Ankara Caņcaya, 376 pp.

A survey of the varieties of opium poppy grown in Turkey, and their evaluations in respect to seed and opium yields.

0766. INOUE, I. 1958. A nomograph for the determination of morphine in opium according to J. P. VI. (Jap; summ. Eng). Bull. Natl. Inst. Hyg. Sci. (Tokyo) 76: 109-111. LC: 499.074 K33S.

0767. INSTITUT NATIONAL DE LA RECHERCHE AGRONOMIQUE. 1967. Report of activities of the Central Station for Genetics and Plant Breeding of Versailles, 1965-1967. (Fr). Centre National de Recherches Agronomiques, Versailles. 241 pp. 105.3 V612.

Breeding experiments are being conducted on *P. somniferum* (pp. 161-172) for increased seed oil content, regulation of the yield, increased morphine content of the capsule and hybridization with *P. bracteatum*.

0768. *IONESCU, M., N. COJOCARU, and A. MIHALEA. 1964. Investigations on the biology and control of *Stenocarus fuliginosus*, a pest of poppy crops. (Rum; summ. Rus and Eng). An. Sect. Prot. Plant., Bucuresti 2: 239-250.

Life-history and control of this pest using various insecticides (Aldrin, DDT, BHC, Lindane).

0769. ISHIYAMA, T. 1936. New or noteworthy fungi parasitic on agricultural plants in southern Saghalien. Trans. Sapporo Nat. Hist. Soc. 14(4): 297-308. 410.9 Sa6.

Macrosporium papaveris, leaf spot of *P. somniferum* in Japan.

0770. ISHIYAMA, T. 1936. List of the fungi parasitic on agricultural plants in Southern Sakhalin. (Jap). J. Sapporo Soc. Agric. 28: 1-20. 22.5 Sol.

Helminthosporium papaveris, *Macrosporium bresdolae* and *Peronospora arborescens* are found on *Papaver somniferum* in Japan.

0771. ISMAILOV, N. M. 1958. Alkaloid-containing plants from the Khaldan and Agdash regions (Boz Dagrange) Azerbaidzahn SSR. (Azerb). Izv. Akad. Nauk. Azerbajdzahnsk SSR, Ser. Biol. Sel'skohoz Nauk 1958(4): 11-16. 442.9 Ak132.

P. arenarium contains small amounts of alkaloids.

0772. ITALLIE, L. VAN. 1946. Research on poppies. (Fr). Ann. Pharm. Franc. 4: 156-160. 396.8 An7.

Alkaloid formation in P. somniferum with methods for assay.

0773. ITALLIE, L. VAN, and M. KERBOSCH. 1910. VII. Contribution to the composition of opium. (Ger). Arch. Pharm. (Berlin) 248: 609-613. 396.8 Ar2A.

Analysis of opium from various countries for the 6 major alkaloids.

0774. ITALO MARRO, R. 1947. Poppy, an extensively cultivated plant. (Span). Campo Suelo Argent. 31: 34-35. 9 C15.

Details of oil seed poppy cultivation in Argentina.

0775. *IVANOVA, R. M. 1969. Prospects of selection in high alkaloid-containing oil poppy in the non-chernozem zone. (Rus). Trudy Vses. Naucho.-Illsed. Inst. Lekar. Rast. 13: 289-293.

Over a 9 year period near Moscow, morphine content of capsules varied from 0.4-0.9% with a dry morphine output equalling about 2 kg/ha. E-4-M-1 was the most promising of 3 new selections.

0776. IVANOVA, R. M. 1970. The perspectives of codeine content increase in Papaver somniferum capsules by selection. (Rus; summ. Eng). Herba Polon. 16(4): 446-452. 451 P87.

Studies to increase the codeine content in the poppy plant show significant variation as a result of weather and heredity.

0777. IVANOVA, R. M. 1972. Use of experimental mutagenesis in breeding of Papaver somniferum L. (Rus; summ. Eng). Genetika 8(1): 30-37. LC: QH431 A1G4.

Ethylene imine (0.05%) and nitrosoethyl urea (0.012%) were used to produce mutants which differed in shape and size of leaf blade, stem and bolls, degree of branching and morphine content from the non-treated.

0778. IVANOVA, R. M. 1972. On breeding oil-bearing poppies with high alkaloid content. (Rus; summ. Eng, Ger and Fr). Vestn. Sel'Skokhoz Nauk. 1972(3): 25-28. 20 V633.

Breeding methods for developing high morphine content in oil poppy.

0779. IVANYI, S. 1966. Effect of the place of growth on the morphine content of poppy. (Hung; summ. Ger). Herba Hung. 5(2/3): 167-171. 71.8 H413.

Several varieties were grown for 2 years at 3 locations where ecological conditions were different. The variety had the greatest influence in determining morphine content since only small variations could be attributed to place of growth.

0780. IVANYI, S. 1968. Varietal experiments with the opium poppy. (Hung; summ. Rus and Ger). Herba Hung. 7(1): 17-25. 71.8 H413.

New hybrids were classified according to seed yield, morphine content and oil content.

0781. IVANYI, S. 1968. Contribution to the evaluation of some poppy varieties (Papaver somniferum L.). (Hung; summ. Rus, Eng and Ger). Hung. Orsz. Mezogazd. Fajta-Term. Minasito Intez. Nemesitett Novenjfajtakkal Vegzett. Orsz. Fajtakiserletek Eredm. 1966: 235-248. 64.9 H89.

Differences over a 6 year period in seed yield, color, pod yield, alkaloid content of empty pods and oil content of seeds are given for different varieties.

0782. IVANYI, S., and C. BARATH. 1969. The use of a new summarized index of values in comparative variety trials with poppies. (Hung; summ. Rus and Ger). Herba Hung. 8(1/2): 97-102. 71.8 H413.

A non-linear equation can express the economically important characters; resistance to lodging, uniformity, seed yield, seed color, capsule yield and useful alkaloid content.

0783. IVANYI, S., C. BARATH, and J. SVAB. 1971. Grading of Papaver varieties on the basis of a pooled economic value-index. (Hung; summ. Rus and Eng). Kiserl. Kozlem. 62(1/3): 73-83. 105.9 H89.

A method is described in which poppy characters, weighed according to their economic importance, are expressed in a single pooled value index.

0784. IZMAILOV, N. A., S. KH. MUSHINSKAYA, and V. A. DANEL'YANTS. 1963. Paper chromatography for controlling the manufacture of alkaloids from the capsules of oleiferous poppy. II. Determination of morphine and codeine. (Rus). Med. Prom. SSSR 17(7): 47-50. LC: R856 M4.

0785. IZMAILOV, N. A., S. KH. MUSHINSKAYA, and V. A. DANEL'YANTS. 1964. Paper chromatography for controlling the manufacture of alkaloids from poppy capsules. III. Determination of narcotine, thebaine and papaverine. (Rus). Med. Prom. SSSR 18(3): 47-51. LC: R856 M4.

Separation of the alkaloids using buffered paper.

0786. JAAP, O. 1922. An additional contribution to the fungus flora of Triglitz in the Prignitz. (Ger). Verh. Bot. Vereins Prov. Brandenburg 64: 1-60. 451 B73V.

Peronospora arborescens occurs on Papaver somniferum and P. dubium in Germany.

0787. JABBAR, A., and E. BROCHMANN-HANSSEN. 1961. Amino acids in opium. J. Pharm. Sci. 50(5): 406-408. 396.8 J825.

The relative amounts of the large number of free amino acids found in crude opium and fresh latex differ, depending on the geographic origin of the sample.

0788. JABLONSKI, Ṁ. 1967. The influence of the spaces between the rows and thinning methods on poppy yield. (Pol; summ. Eng and Rus). Pamietn. Pulawski 25: 205-223. 64.9 In7.

Thinning with a hoe so as to leave groups of 2-3 plants did not lower seed yield compared to thinning by hand. Yields of seed were slightly higher from rows 30 cm apart than from rows 40 cm. Spacing and thinning had no effect on percentage of oil in the seed.

0789. JAHANDIEZ, E., and R. MAIRE. 1932. Catalogue des plantes du Maroc. II. Algeria. 557 pp. SI: 581.964 J25.

Papaveraceae (pp. 255-267) include 9 species of Papaver; among them is P. somniferum.

0790. JÄHNL, G. 1948. Report on arable crops and oil-bearing crops. (Ger). Veroff. Bundesanst. Alp. Landw., Admont No. 3: 44-56. 19 Ad6.

Poppy varietal trials giving yields of seed and oil.

0791. JAKOBEY, I. 1949. Poppy as a source of lecithin. (Hung; summ. Rus and Eng). Agrartudomany 1: 45-46. 19 Ag83.

Extracted from poppy seed meal.

0792. JANICKI, S. 1969. Spray-dried alkaloid extracts. Part II. Chromatographic analysis of spray-dried extracts. (Pol; summ. Rus and Eng). Herba Polon. 15(3): 239-246. 451 P87.

0793. JANOUSEK, V. 1966. Does poppy get enough attention? (Czech). Za Vysokou Urodu 14(10): 373-375. 64.8 Z12.

Culture, fertilizers and harvesting as an oil plant.

0794. JEFFREY, E. C., and R. E. TORREY. 1921. Physiological and morphological correlations in herbaceous angiosperms. Bot. Gaz. 71(1): 1-31. 450 B652.

The idea that modern herbaceous stems are modified from woody ancestral types is reviewed and the physiological correlations that have accompanied these morphological transformations are described. Nodal anatomy of Papaver sp. is described and illustrated.

0795. JEGGE, O. 1951. The beekeeping farmer and the planting of hemp, poppy and rape. (Ger). Schweiz. Bienen-Ztg. 74: 283. 424.8 Sch9.

0796. JENKINS, D. H. 1943. August planting and transplanting. Home Gard. 2(2): 36-37. 80 H756.

August planting instructions for oriental poppy.

0797. JEPSON, W. L. 1925. A manual of the flowering plants of California. Berkeley, Calif. 1238 pp. 455.82 J46M.

Papaveraceae (pp. 397-404) include P. californicum and P. heterophyllum.

0798. *JERMSTAD, A. 1920. On the determination of the strength of morphine in opium. (Fr). Repertoire Pharm. 32: 257-262.

Various methods for determining strength of morphine in opium are discussed: alcohol, water (Helfenberg's), lime, precipitation and reduction, and the polarimeter. A modification of Helfenberg's method is proposed because of several advantages.

0799. JERMSTAD, A. 1921. Das Opium, seine Kultur und Verwertung im Handel. (Opium, its culture and utilization in commerce). Chemisch-technische Bibliothek, Band 368. Leipzig. 208 pp. John Crerar Libr.

After a brief discussion of poppy cultivation and opium use, there is a comprehensive survey of production and exportation for Turkey, Macedonia, Iran, India, Egypt and China. Limited cultivation by other countries is discussed.

0800. JINDRA, A. 1967. Biosynthesis of tropane and opium alkaloids, its biochemical aspects. Acta Fac. Pharm. Bokemoslov. 13: 7-93. MAM: W1 AC803c.

A review of the research done on the biosynthetic pathways of tropane and opium alkaloids in the past 10 years.

0801. *JINDRA, A. 1969. Biochemical aspects of tropane and opium alkaloid formation. (Ger). Folia Pharm. 5(12): 819-826.

Current mechanisms for biosynthesis of opium alkaloid and detailed aspects of alkaloid formation in _P_. _somniferum_ discussed.

0802. JINDRA, A., M. FELKLOVA, V. JIRACEK, and J. BOSWART. 1964. Variations of sugar and morphine content in _Papaver_ _somniferum_ L. during ontogenesis. Pl. Med. 12(2): 205-210. 450 P697.

A decrease in sugar content of the leaves was accompanied by a morphine increase. Glucose and fructose increased in the young capsule but decreased when fat formation occurs, at ripening. At this stage, sucrose and xylose appeared in small amounts.

0803. JINDRA, A., P. KOVACS, and Z. PITTNEROVA. 1966. Biochemistry of poppy alkaloid synthesis. Transaminase and decarboxylase activities in _Papaver_ _somniferum_ L. (Ger). Abh. Deutsch. Akad. Wiss. Berlin, Kl. Chem. 1966(3): 329-333. 509 D482.

Sprouting seedlings contain enzymes which catalyze the transamination of aromatic acids.

0804. JINDRA, A., P. KOVACS, Z. PITTNEROVA, and M. PSENAK. 1966. Biochemical aspects of the biosynthesis of opium alkaloids. Phytochemistry 5: 1303-1315. 450 P5622.

Enzyme systems in _P_. _somniferum_ connected with the metabolism of the presumed precursors of opium alkaloids were examined _in_ _vivo_ and _in_ _vitro_.

0805. JINDRA, A., P. KOVACS, Z. PITTNEROVA, M. PSENAK, M. SOVOVA, and H. SMOGROVICOVA. 1966. Enzymatic reactions in alkaloid biosynthesis. (Ger; summ. Hung). Herba Hung. 5(2/3): 30-39. 71.8 H413.

Enzymatic reactions present in _P_. _somniferum_ include, tyrosine hydroxylation, phenylalanine, tyrosine, 3,4-deoxyphenylalanine and glutaminic acid decarboxylation, secondary oxidative deamination of phenylalanine, tyrosine, 3,4-dioxyphenylalanine, glycine, alanine and of glutaminic acid, transamination of phenylalanine, tyrosine etc. and oxidative reactions which are catalyzed by phenoloxidases.

0806. JINDRA, A., P. KOVACS, H. SMOGROVICOVA, and M. SOVOVA. 1967. Transamination reactions in the biosynthesis of opium, _Nicotiana_, _Lobelia_ and _Datura_ alkaloids. Lloydia 30: 158-163. 442.8 L77.

Includes reactions in _P_. _somniferum_ seedlings.

0807. JINDRA, A., Z. SIPAL, and V. HUDECOVA. 1964. Biosynthesis of alkaloids: On the occurrence of keto acids in _Papaver_ _somniferum_ L. plants. (Summ. Ger). Experientia 20(7): 371-372. 475 Ex7.

Phenylpyruvic and p-hydroxyphenylpyruvic acid were found in poppy plants immediately before and after flowering.

0808. JOACHIMOWITZ, M. 1919. Poppy containing henbane seeds. (Ger). Z. Untersuch. Nahrungs. Genussmittel 37: 183-185. 384 Z39.

An epidemic of poisoning in Vienna was attributed to henbane seeds which had become mixed with poppies during their harvest in Russia.

0809. JOHNSON-ROMUALD, F. 1969. Narcotics control in the Republic of Togo. Bull. Narc. 21(1): 41-45. LC: HV5800 B8.

Legal imports of opium and its derivatives are strictly controlled and illicit traffic is not a big problem.

0810. *JOHRI, M. M. 1965. A contribution to the physiology and biochemistry of seed development in _Papaver_ _somniferum_ and _Zephyranthes_ _lancasteri_. Ph.D. Thesis, Dept. Bot., Univ. Delhi, India.

0811. JOHRI, M. M., and S. C. MAHESHWARI. 1965. Studies on respiration in developing poppy seeds. Pl. Cell Physiol. 6(1): 61-72. 450 P699.

Excised ovules of *P. somniferum* showed an increased oxygen uptake during or preceding pollination, division of endosperm nuclei, cell wall formation in the endosperm and elongation of cotyledons.

0812. JOHRI, M. M., and S. C. MAHESHWARI. 1966. Changes in the carbohydrates, proteins and nucleic acids during seed development in opium poppy. Pl. Cell Physiol. 7(1): 35-47. 450 P699.

Fructose and glucose are present up to the free nuclear stage of the endosperm but decreases when it turns cellular and the sucrose becomes abundant. The N accumulates in 2 phases, the first coinciding with development of the endosperm and the second with development of the embryo.

0813. JONES, G. N. 1963. Flora of Illinois. Amer. Mid. Nat. Monograph 7. 401 pp. SI: QK157 J77.

Papaveraceae (pp. 64-65) include *P. somniferum*, *P. rhoeas*, and *P. dubium*.

0814. JONESCO, ST. 1921. Anthocyanidines in the free state in red leaves and flowers of certain plants. (Fr). Compt. Rend. Hebd. Seances Acad. Sci. 173: 426-429. 505 P21.

Color of *Papaver* flowers is due to anthocyanidines as well as anthocyanins.

0815. JOUVEN, M. 1948. Have you sown your poppy? (Fr). Monde Paysan 3(106): 2. 14 M742.

Popular article on poppy cultivation.

0816. JOUVENEL-MARCILLAC, M. 1942. Cytomixis in Papaveraceae. (Fr). Compt. Rend. Hebd. Seances Mem. Soc. Biol. 136: 468-469. 442.9 P21.

In *P. rupifragum* at the beginning of the heterotypic prophase.

0817. JOZSA, L., and I. PAPP. 1967. Experimental data on the space requirements of poppy. (Hung; summ. Rus and Ger). Herba Hung. 6(1): 65-75. 71.8 H413.

The optimum space/plant for highest yield in chernozem soil was 32 by 10 cm. At this spacing mechanical equipment could be used.

0818. JOZSA, L., and I. PAPP. 1969. On the relationship between planting density and yield of poppy. (Hung; summ. Rus and Ger). Herba Hung. 8(3): 147-154. 71.8 H413.

On sandy loam soil, the optimum spacing between plants was 32 x 10 cm. or 179,556 plants/acre which considerably exceeds the present day planting density in Hungary.

0819. JUSIAK, L. 1958. The use of solutions of oleic acid for the isolation of alkaloids. Diss. Pharm. Pharmacol. 20(5): 577-579. MAM: PO 275J.

The method is economical since no organic solvents are used for extraction of alkaloids from the plant material.

0820. JUSIAK, L., E. SOCZEWINSKI, and A. WAKSMUNDZKI. 1966. Chromatographic analysis of alkaloid extracts of corn poppy flowers (Papaver rhoeas). I. Moist buffered paper chromatography. (Pol; summ. Rus and Eng). Diss. Pharm. Pharmacol. 18(5): 479-483. MAM: PO 275J.

Alkaloids identified were rhoeadine and rhoeagenine in amounts up to 80%, and smaller amounts of protopine, thebaine and coptizine.

0821. JUSTI, J. 1803. De opio. Marburgi Cattorum. 53 pp. MAM.

Early history and medical uses of opium including a chronological bibliography from 1620-1803.

0822. KABAY, J. 1933. Procedure for obtaining opium alkaloids, particularily from poppy plants. (Fr). French Patent 748,308: 1-3. U.S. Patent Office.

Method for extracting alkaloids from straw.

0823. KAJANUS, B. 1918-1919. Genetical studies of the flowers of *Papaver somniferum* L. (Ger). Ark. Bot. 15(18): 1-86. 451 Su2.

Many crosses were made and the flower color of the progeny studied.

0824. KAJANUS, B. 1919. Notes on poppy genetics. (Ger). Bot. Not. 1919: 99-102. 450 B656.

Interspecific crosses and results.

0825. KALANI, D. K., and M. A. MATIN. 1969. Free amino acids of poppy (*Papaver somniferum* L.) leaves infected with *Peronospora arborescens* (Berk.) de Bary. (Summ. Fr and Ger). Lab. Pract. 18: 152. MAM.

Of the 10 amino acids found in infected leaves only 5 were present in healthy leaves.

0826. KALTENBACH, J. H. 1874. Die Pflanzenfeinde aus der Klasse der Insekten. (Plant enemies of the insect class). Ed. 2. Julius Hoffman, Stuttgart, 848 pp. 423 K12.

The following pests are listed on *P. somniferum*: *Ceutorrhynchus macula-alba* Herbst, *C. albovittatus* Germ., *C. abbreviatus* Fb., *Mamestra brassicae* L., *Sciophila wahlbomiana* Hb., *Cynips minor* Hrt., *C. rhoeados* M.-Kl., *Phyomiza albiceps* Meig., *Cecidomyia papaveris* Winn., *C. callida* Winn., *Aphis papaveris* Fb.

0827. KALYMBETOV, B. K. 1959. Material for a sac-fungus flora of Zailian Alatai. (Rus). Trudy Bot. Inst. Akad. Nauk Kaz. SSR, Inst. Bot. 7: 268-338. 451 AL63.

Sclerotinia sclerotiorum on *P. somniferum* in USSR.

0828. KAMETANI, T., and K. FUKUMOTO. 1971. Synthesis of morphinandienone alkaloids by phenol oxidation and the Pschorr reaction. J. Heterocycl. Chem. 8(3): 341-356. QD1 J68.

A review of biogenetic and nonbiogenetic synthesis of some alkaloids including floripavine from *P. floribundum*, amurine from *P. nudicaule* var. *amurense* and nudaurine from *P. nudicaule* var. *aurantiacum*.

0829. KAMETANI, T., K. FUKUMOTO, and T. SUGAHARA. 1969. Total synthesis of (±)-amurine. J. Chem. Soc. (C) 1969(5): 801-804. QD241 C5.

0830. KAMETANI, T., S. TAKANO, and T. KOBARI. 1971. Studies on the synthesis of heterocyclic compounds. CCCLXXXIV. The formation of beta-hydroxyreticuline by enzymic phenolic oxidation with homogenized *Papaver rhoeas* and hydrogen peroxide. J. Chem. Soc. (C) 1971(6): 1030-1031. QD241 C5.

0831. KAMP, W. 1957. Determination and separation of alkaloids in crude drugs and galenicals with the aid of ion exchange resins. (Dutch; summ. Eng). Pharm. Weekblad 92(1): 1-24. 396.8 P4922.

The 6 principal alkaloids of opium can be separated.

0832. KAMP, W., and W. J. M. ONDERBERG. 1966. Separation and identification of opium and ipecacuanha alkaloids *in pulvis opii compositus* by thin-layer chromatography. Pharm. Weekbl. 101: 1077-1083. 396.8 P4922.

Separation of 8 alkaloids by silica-gel thin-layer 2 dimensional chromatography.

0833. KANTA, K. 1960. Intra-ovarian pollination in *Papaver rhoeas* L. Nature 188: 683-684. 472 N21.

The technique of injecting a suspension of pollen grains into the ovarian cavity by syringe is described. Since normal viable seeds were obtained, the method may overcome some types of incompatibility.

0834. KANTA, K., and P. MAHESHWARI. 1963. Intraovarian pollination in some Papaveraceae. Phytomorphology 13: 215-229. 450 P566.

Ovaries of *P. somniferum* and *P. rhoeas* injected with pollen suspensions developed as well as those naturally pollinated. Seed-set was lower than normal but gave 100% germination.

0835. KANTA, K., and P. MAHESHWARI. 1963. Test-tube fertilization in some angiosperms. Phytomorphology 13: 230-237. 450 P566.

Germination of pollen, double fertilization and the development of endosperm, embryo and seed proceeded normally in test tube cultures of pollen and ovules in 3 Papaveraceae, *P. somniferum*, *Argemone mexicana* and *Eschscholzia californica*. Some normal seedlings were produced.

0836. KAPOOR, L. D. 1961. Poppy cultivation is paying. Indian Farming 11(7): 8-9. 22 In283.

A short account of the early history of *P. somniferum*, its 2 races, its cultivation in India and the manufacture of opium.

0837. KARP, M. L. 1946. On the occasional absence of opium in the opium poppy. Compt. Rend. (Dokl.) Acad. Sci. USSR 52(6): 537-540. 511 P444.

The proportion of plants which exude no latex depends on the soil, rare where the soil is poor and as high as 25-30 or even 45% in very rich soil. The absence of opium is not related to vigor and is probably genetically determined.

0838. *KASAEVA, M. A. 1929. Hybridization experiments between *Papaver somniferum* and *P. bracteatum*. Acad. Sci. Ukraine Bull. Cl. Sci. Phys. Math. 4(4): 220-233.

P. somniferum pollinated by *P. bracteatum* gave 73-93% success; reverse yielded non-viable seeds; F_1 not uniform, patricliny prevailing; F_2 plants perennial but not very cold resistant; F_3 obtained.

0839. KASAEVA, M. A. (KASSAYEVA, M. A.) 1930. Hybridization experiments between *Papaver somniferum* L. and *Papaver bracteatum* Lindl. (Rus; summ. Eng). Trudy Vsesojuzn. Sezd. Gen. Selek. Semenov. Plemenn. Zhivotnov 2: 295-306. 442.9 V96.

Hybrids were obtained with *P. bracteatum* as the pollen donor but not with *P. somniferum*.

0840. KAUFMANN, H. P., and M. C. KELLER. 1941. Oil seed analysis. I. Fat determination. (Ger). Fette & Seifen 48: 737-743. 384 C422.

Problems of oil seed analysis are discussed and a new method for fat determination in seeds including poppy is described.

0841. KAUKOVIRTA, E. 1963. First notes on winter hardiness experiments with ornamentals. (Fin). Puutarha 66: 24, 26-27. 80 P99.

Papaver alpinum and *P. radicatum* were killed during winter field trials in Finland.

0842. KAVKA, F., J. TROJANEK, and Z. CEKAN. 1965. Isolation of morphine from poppy capsules. II. Statics and dynamics of adsorption and desorption of morphine on cation exchange agents. (Ger). Pharmazie 20(4): 220-224. LC: RS1 P673.

Tests for the determination of optimum conditions for the adsorption of morphine are described.

0843. KAVKA, F., J. TROJANEK, and Z. CEKAN. 1965. Isolation of morphine from poppy capsules. III. Processing of methanol poppy capsule extracts with cation exchangers. (Ger). Pharmazie 20: 429-434. LC: RS1 P673.

Discussion of the method.

0844. *KAVKA, F., J. TROJANEK, and Z. CEKAN. 1965. Isolation of morphine from poppy capsules. IV. Determination of morphine effluent (eluate) by adsorption on cation-exchangers. (Ger). Pharmazie 20(7): 434-435. LC: RS1 P673.

A rapid method for determining small amounts of morphine in the presence of considerable amounts of other substances.

0845. KAWATANI, T., and H. ASAHINA. 1959. External characters and alkaloids of the artificial interspecific F_1 hybrid between Papaver orientale L. and P. somniferum L. Jap. J. Genet. 34(1): 353-362. 442.9 J27.

The hybrid is perennial, resembling the female parent in stem, flower buds and adult leaves and the male parent in the flower shoot. The alkaloids are those of both parents.

0846. KAWATANI, T., and S. FUJITA. 1957. On the morphological characteristics and morphine productivity of foreign opium poppies, Papaver somniferum L. (Jap; summ. Eng). Bull. Natl. Inst. Hyg. Sci. (Tokyo) 75: 157-164. LC: 499.074 K33S.

'Ikkanslu', a Japanese cultivar of the opium poppy was compared with 67 cultivars of foreign origin for morphine percentage, weight of opium, time of capsule incision, height, leaf color, bud shape and peduncle.

0847. KAWATANI, T., and S. FUJITA. 1958. Relation of the two methods of successive incision of poppy capsule to the opium and morphine yields. (Jap; summ. Eng). Bull. Natl. Inst. Hyg. Sci. (Tokyo) 76: 119-131. LC: 499.074 K33S.

Statistical studies of 2 methods of capsule incison, adjacent cutting and opposite cutting.

0848. KAWATANI, T., S. FUJITA, and T. OHNO. 1957. On the characteristics of 'Ikkanshu', a cultural strain of opium poppy. (Jap; summ. Eng). Bull. Natl. Inst. Hyg. Sci. (Tokyo) 75: 151-155. LC: 499.074 K33S.

A history of the strain with its morphological characteristics and yield of opium.

0849. KAWATANI, T., and T. OHNO. 1965. Chromosome numbers in Papaver. (Jap; summ. Eng). Bull. Natl. Inst. Hyg. Sci. (Tokyo) 83: 127-133. LC: 499.074 K33S.

Numbers are reported from 76 populations of 52 taxa (46 species) of Papaver.

0850. *KAYIHAN, S. 1946. Opium and other narcotic drugs. (Turk). Ahmet. Sait Matbaasi Istanbul, Nos. 1-2: 1-375.

0851. KAZARYAN, E. S., and P. G. DELLA-ROSSA. 1967. Toward the study of anomalous forms of Papaver and Alcea with copper-molybdic deposits in the Armenian SSSR. (Rus). Izv. Biol. Nauk. 20(1): 29-33. 20 Er4.

A study of various anomalies of the flowers of P. fugax, P. dubium and P. orientale enables one to detect copper and molybdenum in the soil and their ores underneath.

0852. KEARSEY, M. J. 1965. Biometrical analysis of a random mating population: A comparison of five experimental designs. Heredity 20(2): 205-235. 443.8 H42.

Mathamatical analysis of flowering time variability in samples of P. dubium.

0853. KEISSLER, C. 1925. Labels for the dried specimens of Cryptogams, published by the Vienna Natural History Museum. (Lat). Ann. Naturhist. Mus. Wien 38: 134-149. 410.9 V672.

Helminthosporium papaveris on Papaver somniferum in Austria.

0854. KELLER, E. F. 1950. Variation and inheritance of characteristics in plants under the influence of environmental factors. (Rus). Akad. Nauk SSSR, Inst. Lesa Lab. Evolut. Ekol. Rast. im B.A. Kellera, Trudy 2: 76-92. 451 AK13.

Experiments with P. somniferum show that environment can change the form and shape of plants.

0855. KELLER, E. F. 1952. Inheritance of an acquired characteristic under the influence of an environmental factor as exemplified by the experiment with *Papaver somniferum*. (Rus). Akad. Nauk SSSR, Inst. Lesa Lab. Evolut. Ekol. Rast. im B.A. Kellera, Trudy 3: 151-161. 451 AK13.

Capsule characteristics.

0856. KENDA, G. 1950. Anthocyanin in the epidermis of the anthers of *Papaver rhoeas*. (Ger). Phyton (Horn) 2(4): 287-290. 450 P565.

The epidermal cells, not including the guard cells, of the anthers are filled with dark-violet drops which contain anthocyanin.

0857. KERBOSCH, M. G. J. M. 1910. Formation and distribution of some alkaloids in *Papaver somniferum* L. (Ger). Arch. Pharm. 248: 536-567. 396.8 Ar2A.

Survey of alkaloids in plant parts during different stages of development.

0858. KEREKES, P., K. DELENK-HEYDENREICH, and S. PFEIFER. 1970. *Papaver* alkaloids. XXXIV. Synthesis of (+)-bracteoline. (Ger). Tetrahedron Lett. 1970(28): 2483-2484. 385 T29.

0859. KEREKES, P., K. DELENK-HEYDENREICH, and S. PFEIFER. 1972. Total synthesis of (±)-bracteoline. (Ger; summ. Eng). Chem. Ber. 105: 609-613. 384 B45.

Prepared from 2-(3-methoxy-4-benzyloxyphenyl)-ethylamine and 4-benzyloxy-3-methoxy-6-nitrophenylacetyl chloride.

0860. KERNICK, M. D. 1961. Agricultural and Horticultural Seeds, their production, control and distribution. Part 2. Seed production of specific crops. FAO, Agricultural Studies No. 55. Rome. 531 pp.

Row spacing, average seed yield, harvesting methods, pollination and diseases are given for *P. nudicaule* (pp. 245, 254), *P. orientale* (p. 257), *P. rhoeas* (p. 254) and *P. somniferum* (pp. 254, 364-366).

0861. KERZMAN, N. 1946. Serious social dangers of some cultivated plants. Strict control is necessary. (Span). Campo Suelo Argent. 30: 94-95. 9 C15.

Argentina's need for pharmaceutical purposes is about 1000 kg morphine, equivalent to about 600 ha of poppies.

0862. KESKOVA, E. S. 1963. Intravarietal and intervarietal hybridization in the oil poppy. (Rus). Agrobiologija 4: 619-622. 20 Ag822.

All the new hybrids produced higher yields of seeds, pods and oil than the parents; inter- were higher than intra-.

0863. KEVANY, J., R. FIERRO-BENITEZ, E. A. PRETELL, and J. B. STANBURY. 1969. Prophylaxis and treatment of endemic goiter with iodized oil in rural Ecuador and Peru. Amer. J. Clin. Nutr. 22(12): 1597-1607. 389.8 J824.

The inhabitants of 5 isolated villages, where salt-iodization programs could not be undertaken, were injected intramuscularly with iodized poppy seed oil. After 2 years there was a sharp reduction in the incidence of goiter, particularily among those under 18 years of age.

0864. KHAN, A. H. 1957. Studies on growth and cultivation characteristics of medicinal and other economic plants under semi-temperate conditions. Pakistan J. Forest. 8(4): 319-369. 99.8 P17.

Included is P. somniferum with details of cultivars, cultivation, diseases, harvest and yields in Pakistan.

0865. KHLEBNIKOVA, N. A. 1941. Growth and development of white poppy on varying daylength. Compt. Rend. (Dokl.) Acad. Sci. URSS 32(7): 503-504. 511 P444A.

The two subspecies studied differed in their relative response to varying photoperiods. On short daylengths the rosette phase is longer, stalk formation to budding is reduced and the period from budding to flowering increases.

0866. KHOLODOVA, V. P. 1961. An electrolytic hygrometer to determine air humidity inside fruits. (Rus; summ. Eng). Fiziol. Rast. 8(4): 512-515. 450 F58.

Measured the relative humidity in the capsule of the poppy.

0867. KHOLODOVA, V. P. 1964. Fractional composition of the proteins in poppy seeds in connection with its physiological functions. (Rus; summ. Eng). Fiziol. Rast. 11(6): 1038-1046. 450 F58.

During seed development non-extractable nitrogen decreases and reserve protein (globulins and albumins) which comprise up to 90% of the protein of isolated aleurone grains accumulate. Composition of these reserve proteins is discussed.

0868. *KHOREV, I. 1957. The achievements of poppy growers in Priissykbul're. (Rus). S. Kh. Kirgizii 1957(10): 29.

A quick ripening variety '222' gave up to 35% higher yields of opium.

0869. KHOTIN, A., and I. TRYNDIN. 1967. Harvesting the oil poppy. (Rus). Zernovye Maslich. Kul't. 8: 46-47. Sb183 Z4.

Machinery equipment.

0870. KHOTIN, A. A., and G. M. SEGAL. 1968. Desiccation of oil poppy. (Rus). Trudy Vessojuzn. Nauch.-Issl. Inst. Lekarstv. Rast. 13: 185-192.

Gramoxone (paraquat), Reglone (diquat) and magnesium chlorate effectively desiccated poppies in order to achieve rapid seed ripening, but did not reduce yields, seed germination or the morphine content of the capsules.

0871. KHRISTOV, A. 1930. The Pleospora disease of cultivated poppy. (Bulg; summ. Eng). Bulgaria Government Printing Office, Sofia. 99 pp. 464.09 K52.

Pleospora calvescens is the most destructive disease on *Papaver somniferum* in Bulgaria.

0872. KHRISTOV, A. 1930. Some plant diseases new for Bulgaria. (Bulg; summ. Ger). Sviedienia po Zemeledelieto 11(11/12): 3-16. Z1 B87.

Bacterium papavericola produces spots on all parts of *Papaver somniferum*. *Pleospora calvescens* is found on decaying stems and its conidial form, *Helminthosporium papaveri* causes a serious disease of poppy.

0873. KHRISTOV, A. 1931. A bacterial blight of the opium poppy. (Bulg; summ. Eng). Renseignements Agricoles 12: 27-46. Commonw. Myc. Inst. Libr.

A bacterium identical with *Bacterium papavericola* causes spotting of the leaves, stems and heads.

0874. KHRISTOV, A. 1933. A new bacterial blight of opium poppy caused by Bacillus (Erwinia) papaveri sp. nov. (Bulg; summ. Eng). Spis. Zemedel. Opitni Inst. Bulgaria 5(9/10): 1-31. 106.3 R32.

The blight is found on P. somniferum and P. alpinum, and on cross inoculation can attack P. orientale.

0875. KHRISTOV, A. 1934. Some new plant diseases for Bulgaria. (Bulg; summ. Eng). Izv. Bulg. Bot. Druzh. 6: 37-48. 451 B61.

Oidium erysiphoides found on P. somniferum in Bulgaria.

0876. KHRISTOV, A. 1943. Fungi causing spots on the balls and molding the seed of opium poppy. (Bulg; summ. Eng). Spis. Zemedel. Opitni Inst. Bulgaria 13(1/2): 13-19. 106.3 R32.

Alternaria brassicae var. somniferi, Cladosporium herbarum, Fusarium sp., F. scirpi var. caudatum, Heterosporium echinulatum, Macrosporium bresadolae, Mucor mucedo, Ophiobolus sativus, Pencillium sp., Rhizopus sp., Sclerotinia sp., and Trichothecium roseum.

0877. KINGDON-WARD, F. 1952. Opium in the Mishmi Hills. Gard. Chron. 131: 56. 80 G162.

The Mishmis cultivate a poor crop of poppy having no permanent fields. The opium is made into a solution in which they soak home grown tobacco and then smoke it. They also eat the soft unripe seeds and leaves are fed to the pigs.

0878. KINOSHITA, K. 1958. Studies on the effects of nitrogenous manures upon the growth and the yield of opium poppy (Papaver somniferum L.). (Jap; summ. Eng). Bull. Natl. Inst. Hyg. Sci. (Tokyo) 76: 133-137. LC: 499.074 K33S.

The fresh weight of the plant and the opium, morphine and seed yields were highest with non-sulphatic fertilizers, such as ammonium chloride.

0879. KINOSHITA, K. 1959. On the differentiation of flower bud and flowering phenomena of opium poppy (Papaver somniferum L.). Bull. Natl. Inst. Hyg. Sci. (Tokyo) 77: 273-278. LC: 499.074 K33S.

Differentiation of the bud was observed 80 days before flowering and reduction division of the pollen occurred 13 days before flowering. The opening of the flower takes 3 hours and occurs from 5 AM to 11 AM.

0880. KINOSHITA, K. 1967. On the effect of composed ratio of potassium manures upon the growth and the yield of opium poppy (Papaver somniferum L.). (Jap; summ. Eng). Bull. Natl. Inst. Hyg. Sci. (Tokyo) 85: 98-100. LC: 499.074 K33S.

The quantity of K did not influence the morphine content of the opium.

0881. *KINOSHITA, K., Y. NAKAGAWA, and H. ISAKA. 1959. Studies on the effects of the ratio of nitrogenous manures upon the growth and the yield of opium poppy (Papaver somniferum). (Jap; summ. Eng). Bull. Natl. Inst. Hyg. Sci. (Tokyo) 77: 267-271. LC: 499.074 K33S.

Whole plant fresh weight and opium, morphine and seed yields were highest with 2:1:1 NPK fertilization.

0882. KINOSHITA, K., Y. NAKAGAWA, H. ISAKA, and T. KOMINE. 1960. Studies on the effects of the composed ratio of phosphoric manures upon the growth and the yield of opium poppy. (Jap; summ. Eng). Bull. Natl. Inst. Hyg. Sci. (Tokyo) 78: 43-47. LC: 499.074 K33S.

The quantity of phosphoric acid did not influence the morphine content of the opium.

0883. KINOSHITA, K., Y. NAKAGAWA, H. ISAKA, and T. KOMINE. 1961. Studies on the effects of soil moisture upon the growth and yield of opium poppy (Papaver somniferum L.). (Jap; summ. Eng). Bull. Natl. Inst. Hyg. Sci. (Tokyo) 79: 147-150. LC: 499.074 K33S.

Fresh weight of the plant and opium and morphine yields were best with a soil moisture of 65-80%.

0884. *KINOSHITA, K., Y. NAKAGAWA, H. ISAKA, and T. KOMINE. 1962. Studies on the effects of soil acid upon growth and yield of opium poppy (Papaver somniferum L.). (Jap; summ. Eng). Bull. Natl. Inst. Hyg. Sci. (Tokyo) 80: 158-161. LC: 499.074 K33S.

Fresh weight of whole plant, opium, morphine and seed yields were best in soils of pH 7.0, and gradually decreased with increase or decrease in soil acidity.

0885. KINZE, W. 1965. Recent studies on the detection, separation and determination of opium alkaloids. (Ger). Pharm. Prax., Berlin 11: 241-247. MAM.

A review of methods.

0886. KIRBY, G. W. 1967. Biosynthesis of the morphine alkaloids. Science 155: 170-173. 470 Sci2.

Tracer experiments have established the major biosynthetic steps leading from tyrosine to morphine in the opium poppy.

0887. KIRBY, G. W., and S. R. MASSEY. 1971. An efficient preparation of isocodeine from codeine. J. Chem. Soc. (C) 1971(18): 3047-3048. QD241 C5.

The conversion has a yield of 65-70%.

0888. KIRBY, G. W., S. R. MASSEY, and P. STEINREICH. 1972. Biosynthesis of unnatural morphine derivatives in *Papaver somniferum*. J. Chem. Soc. (C) 1972(13): 1642-1647. QD241 C5.

Demethylation of various codeine derivatives to give the corresponding unnatural derivatives of morphine was studied in *Papaver somniferum*. These processes were compared with those of natural codeine to morphine conversions.

0889. KIRCHNER, O. VON. 1923. Die Krankheiten und Beschadigungen unserer landwirtschaftlichen Kulturpflanzen. (Diseases and damage to our agricultural crops). 3rd. Ed., Eugen Ulmer, Stuttgart. 679 pp. 464 K63.

Poppies are discussed on pp. 308-310. Fungi: *Erysiphe polygoni*, *Entyloma fuscum*, *Dendryphium pencillatum*, *Alternaria brassicae* var. *somnifera* and *Peronospora arborescens*. Nematodes: *Heterodera schachtii*.

0890. KIRCHNER, O. VON, and A. BOLTSHAUSER. 1898. Atlas der Krankheiten und Beschädigunge unserer landwirtschaftlichen Kulturpflanzen, Ser. III. Wurzelgewächse und Handelsgewächse. E. Ulmer, Stuttgart. 22 Plates with text. 464 K63A.

False mildew of oil poppy (*Peronospora arborescens*) on Plate 22.

0891. KISELEV, V. V., and R. A. KONOVALOVA. 1948. Alkaloids of wild species of the poppy. VIII. Alkaloids of *Papaver bracteatum*. Zhurn. Obshch. Khim. 18: 142-150. 385 Z6.

Procedure is given for the isolation of 4 phenolic bases, isothebaine, oripavine, bracteine and bractamine.

0892. KISPATIC, J. 1950. A contribution to the list of parasitic fungi of Croatia. (Croat; summ. Eng). Hrvatsko Prirodoslovno Drustvo, Glasnik Bioloske Sekcije 2B(2/3): 44-50. 510 Z1B.

Helminthosporium papaveris on *P. somniferum* in Yugoslavia.

0893. KITAGAWA, M. 1939. Lineamenta florae Manshuricae. Rep. Inst. Sci. Res., Manchoukuo, III. 487 pp. SI: 506.518 H87.

Papaveraceae (pp. 232-235) include *P. nudicaule* and *P. radicatum*.

0894. KITAMURA, S. 1960. Flora of Afghanistan. Results of the Kyoto University Scientific Expedition to the Karakoram and Hindukush, 1955. Vol. II. Kyoto University, Kyoto. 486 pp. SI: QK352 K62.

Papaveraceae (pp. 133-136) include *P. croceum*, *P. decaisnei* var. *dielsianum*, *P. dubium* var. *laevigatum*, *P. pavonicum*, *P. rhoeas* and *P. somniferum*.

0895. KITAMURA, S. 1964. Plants of West Pakistan and Afghanistan. Results of the Kyoto University Scientific Expedition to the Karakoram and Hindukush, 1955. Vol. III. Kyoto University, Kyoto. 283 pp. SI: QK358 K62.

Papaveraceae (pp. 67-70) include *P. croceum*.

0896. KJAER, A. 1940. Germination of buried and dry stored seeds. I. 1934-1939. (Summ. Ger). Proc. Int. Seed Testing Assoc. 12: 167-190. 61.9 In84P.

P. rhoeas seeds retained their viability both in dry storage in the laboratory and when buried in the ground for up to 5 years.

0897. KJAER, A. 1948. Germination of buried and dry stored seeds. II. 1934-1944. Proc. Int. Seed Testing Assoc. 14: 19-26. 61.9 In84P.

After 10 years of storage, *P. rhoeas* seeds stored in paper bags in the laboratory had lost their viability but 6% of those buried in the ground germinated.

0898. KJELLANDER, E. 1943. Some pests of oil crops. (Swed). Vaxtskyddsnoitiser 6: 1-6. 464.9 Sw3V.

The following insects and the symptoms they cause on poppy in Sweden are described: *Ceutorrhynchus quadridens*, *Scaptomyzella flava*, *Dasyneura brassicae* and *Contarinia nasturtil*.

0899. KJELLANDER, E. 1945. *Carpodiplosis papaveris* nov. gen, nov sp., a new pest of oil poppy. (Dipt. Cecid). Opuscula Entomol. 10(1/2): 38-42. 421 Op7.

Infests the capsules of the poppies in Sweden.

0900. KJELLANDER, E. 1945. Poppy midge, a new pest of oil poppies in Sweden. Vaxtskyddsnotiser 1: 15-16. 464.9 Sw3V.

Carpodiplosis papaveris.

0901. KJUNGDAHL, H. 1922. Cytology of the genus *Papaver*. (Ger). Svensk Bot. Tidsk. 16(1): 103-114. 450 Sv2.

Chromosome studies of hybrids, *P. atlanticum* x *P. dubium* and *P. somniferum* x *P. orientale*.

0902. KLASEK, A., V. SIMANEK, and F. SANTAVY. 1968. Conversion of rhoeageninediol to coptisine. Tetrahedron Lett. 1968(43): 4549-4551. 385 T29.

0903. KLEINSCHMIDT, G. 1959. Investigations on the distribution of alkaloids in the organs of the poppy plant in the course of growth. (Ger; summ. Eng). Pl. Med. 7(4): 471-476. 450 P697.

Analysis of the alkaloids of a pure poppy strain during development, with special reference to the lesser alkaloids.

0904. KLEINSCHMIDT, G. 1960. Investigations on distribution of amino acids in the organs of the poppy plant during growth. (Ger; summ. Eng). Pl. Med. 8(1): 114-120. 450 P697.

A possible relation between alkaloid synthesis and amino N metabolism is discussed, based on the distribution of free and proteinbound amino acids.

0905. KLEINSCHMIDT, G. 1960. Contribution to the physiology of the opium poppy alkaloids. Demethylation of codeine to morphine in the poppy plant. (Ger). Pharmazie 15(11): 663-664. LC: RS1 P673.

Labeled codeine was demethylated to morphine by isolated poppy leaves and the reaction was unidirectional. Labeled tyrosine was converted to both morphine and codeine.

0906. KLEINSCHMIDT, G. 1961. The distribution of alkaloids in the organs of *Papaver orientale* during the vegetative period. (Ger). Arch. Pharm. 294: 254-258. 396.8 Ar2A.

Isothebaine was the principal alkaloid in all the organs at all stages of development in the cultivar 'Brilliant'.

0907. KLEINSCHMIDT, G. 1963. The present status of research on the biosynthesis and physiology of the alkaloids in the poppy (*Papaver somniferum* L.). Abh. Deutsch Akad. Wiss. Berlin, Kl. Chem. 4: 265-271. 509 D482.

0908. KLEINSCHMIDT, G., and K. MOTHES. 1958. Cultivation of a medicinal opium poppy (*Papaver somniferum*). Preliminary communication. (Ger). Pharmazie 13(6): 357-360. LC: RS1 P673.

About 400 varieties of high morphine yielding poppies showed variable alkaloid yield, according to the climate, in Germany. Selections for high yield were made.

0909. KLEINSCHMIDT, G., and K. MOTHES. 1959. On the physiology and biosynthesis of the alkaloids of *Papaver somniferum*. (Ger). Z. Naturf. 14B(1): 52-56. 474 Z3.

Isolated leaves, capsules and latex are able to form radioactive alkaloids from uniformly labeled tyrosine.

0910. KLEINSCHMIDT, G., and K. MOTHES. 1960. Further experiments on biosynthesis of alkaloids by opium poppy (*Papaver somniferum* L.). (Ger). Arch. Pharm. 293(10): 948-953. 396.8 Ar2A.

Labeled glucose and sucrose is incorporated into alkaloids in isolated leaves and latex. Addition of ATP, coenzyme A or glutathione activates the incorporation of glucose C^{14}.

0911. KLITSCH, C. 1942. New experiences in poppy cultivation. (Ger). Mitt. Landwirtschaft 57: 30-31, 49-50. Iowa State Univ. Libr.

The first part is a study of field rotation of poppy with winter wheat or barley. The second part gives yields of poppy cultivated simultaneously with beet or caraway.

0912. KLJAJIC, R. 1958. Some less known plant pathogens in the Peoples Republic of Macedonia. (Croat; summ. Eng). Zast. Bilja 47/48: 97-103. 464.8 Z1.

Peronospora arborescens, *P. papaveracea* and *Bacterium papaveri* on *Papaver somniferum*.

0913. KLOTZER, W., S. TEITEL, and A. BROSSI. 1971. A total synthesis of the alkaloid rhoeadine. Preliminary communication. Helv. Chim. Acta 54(7): 2057-2059. 385 H36.

From (-)-bicuculline.

0914. KLYSHEV, L. K., and I. A. KORDAKOV. 1964. Dynamics of free amino acids in opium poppy during growth and the biosynthesis of alkaloids. (Rus). Vestn. Akad. Nauk Kazahsk. SSR 20(1): 71-76. 511 AL6.

During the vegetative period there was considerable fluctuation in the qualitative and quantitative composition of free amino acids. The maximum amount was observed during stem growth and flowering, with a gradual decrease until maturation of the seeds.

0915. KLYSHEV, L. K., and G. A. SYRTANOVA. 1969. Flavonoid-containing plants of the Central Botanical Gardens of the Academy of Sciences of Kazakh SSR. (Rus). Trudy Bot. Sadov, Akad. Nauk Kaz. SSR 11: 108-110. 451 A16.

The flavonoid contents of the raceme, leaves and stalks during flowering of a number of plants including P. pavonium.

0916. KNABE, J., and P. HORN. 1967. Cleavage of DL-armepavine into optical antipodes. (Ger). Arch. Pharm. 300(6): 547-549. 396.8 Ar2A.

0917. KNABEN, G. 1958. Papaver studies. Apology for P. radicatum Rottb. as an Icelandic-Scandinavian species. (Nor; summ. Eng). Blyttia 16: 61-80. 450 B622.

Morphological and chromosomal evidence for differences between P. radicatum, P. dahlianum and P. lapponicum.

0918. KNABEN, G. 1959. On the evolution of the Radicatum-group of the Scapiflora Papavers as studied in 70 and 56 chromosome species. Part A. Cytotaxonomical aspects. Opera Bot. (Suppl. Bot. Not.) 2(3): 1-74. 450 Op22.

Delimiting species of this group is difficult because many characteristics such as hairness, incision of the leaves, color, etc. vary greatly within species. The type of leaves and capsule and the structure of the stigmatic disc are the best taxonomic criteria.

0919. KNABEN, G. 1959. On the evolution of the *Radicatum*-group of the *Scapiflora* Papavers as studied in 70 and 56 chromosome species. Part B. Experimental studies. Opera Bot. 3(3): 1-96. 450 Op22.

Chromosome pairing was studied in crosses between diploid and polyploid species. Analysis of the pairing showed that the colonies within the races are related more closely than are the races.

0920. KNABEN, G. 1970. The concept of species in the *Scapiflora* section of the genus *Papaver*. (Nor; summ. Eng). Blyttia 28(3): 187-193. 450 B622.

The concept is discussed in polyploid *Scapiflora* Papavers including the effect of genetic drift in isolated populations and strong differential in chromosome structure.

0921. KNABEN, G., and N. HYLANDER. 1970. On the typification of *Papaver radicatum* Rottb. and its nomenclatural consequences. Bot. Not. 123(2): 338-345. 450 B656.

0922. KNAPP, L. W. 1945. Why did my oriental poppies die? Natl. Hort. Mag. 24: 133-134. 80 N216.

Poppies need perfect drainage and the crown planted 7 cm below the soil surface.

0923. KNOCHE, H. 1922. Flora Balearica. II. Montpellier, France. 585 pp. SI: 581.9467 K72.

Papaveraceae (pp. 3-11) include *P. somniferum* var. *setigerum*, *P. rhoeas*, *P. dubium*, *P. pinnatifidum*, *P. argemone* and *P. hybridum*.

0924. KNOLL, ___, and L. MULLER. 1943. Should one ignore or accept the opium poppy? (Ger). Landesbauerschaft Sachsen. Wchnbl. 91: 245. 18 Sa1.

0925. KNYPL, J. S., and T. SLUPEK. 1968. Growth retardants in relation to the germination of seeds. Part II. Comparative analysis of the course of germination in seeds treated with (2-chloroethyl) trimethylammonium chloride. (Pol; summ. Eng and Rus). Roczn. Nauk Roln., Ser. A, Rosl. 94: 233-239. 20.5 R59.

Poppy germination was not affected by concentrations at 5 x 10^{-2}M.

0926. KOBLITZ, H. 1969. Plant cells *in vitro* and their biochemical potential. (Ger). Biol. Rundschau 7(6): 241-249. 442.8 B5272.

A review of the biosynthesis of alkaloids, steroids, saponins, triterpenes and cardenolides in tissue culture of different plant parts reported from the pharmacological viewpoint.

0927. KOBLITZ, H., K. GRÜTZMANN, and I. HAGEN. 1967. Tissue culture of alkaloid plants. I. *Papaver somniferum* L. (Ger; summ. Eng). Z. Pflanzenphysiol. 56(1): 27-32. 450 Z32.

P. somniferum stalk tissue was cultured on a defined medium. Glutathione promoted intense callus formation.

0928. KOCH DE BROTOS, L., and C. BOASSO. 1955. List of the plant diseases in Uruguay. (Span). Uruguay Dir. Agron. Publ. 106: 5. 9.9 Ur84.

Peronospora arborescens on *Papaver somniferum*.

0929. KÖHLER, H. 1963. Disinfection research for control of helminthosporiosis in the oil poppy (*Papaver somniferum* L.) with culture filtrates containing antibiotics. (Ger; summ. Rus and Eng). Nachrichtenbl. Deutsch. Pflanzenschutzd. n.s. 17(10/11): 165-170. 464.9 N11.

Filtrates from Streptomycetes and from *Penicillium patulum* and *P. expansum* applied as seed dressings gave good control of *Helminthosporium papaveris* and increased crop weights.

0930. KOHOUTOVA, Z. 1953. Poppy breeding with regard to oil content. (Czech; summ. Rus and Eng). Preslia 25: 97-106. 450 P92.

Crosses between 7 varieties showed heterosis of oil content in 60% of the hybrids. There was no relation between the shape of the capsule and the oil content.

0931. KOJCIU, E., and F. SIL'VA. 1963. Concerning the selection of dual-purpose poppies. (Rus). Agrobiologija 5: 709-714. 20 Ag822.

Selection of varieties in Rumania giving high yields of oil from the seeds and of morphine from the capsules.

0932. KOLE, A. P., and P. J. J. PHILIPSEN. 1956. On the susceptibility of non-crucifers to the zoosporangial stage of *Plasmodiophora brassicae* Woron. (Dutch; summ. Eng). Tijdschr. Plantenziekten 62(4): 167-170. 464.8 T44.

P. rhoeas can be infected.

0933. KOLEVA-SEKUTKOVSKA, M. 1959. Contribution to the knowledge of the parasitic flora in the Peoples Republic of Macedonia (Yugoslavia). (Maced; summ. Eng). Zast. Bilja 51: 107-115. 464.8 Z1.

Peronospora arborescens collected on *Papaver somniferum*.

0934. KOMAROV, V. 1929. Flora Peninsulae Kamlsckatka II. (Rus). Leninopoli. 369 pp. SI: 581.957 K81.

Papaveraceae (pp. 157-162) include *P. microcarpum*, *P. radicatum* and *P. alboroseum*.

0935. KONDO, M. 1927. Seeds used in agriculture of Japan. VII. (Ger). Ber. Ohara Inst. Landw. Forsch. 3(5): 457-495. 107.6 OH1.

The external characters and anatomical structure of the seed and seedlings of a number of plants including *P. somniferum*.

0936. KONOVALOVA, R., S. YUNUSOV, and A. OREKHOV. (KONOWALOWA, YUNUSSOFF, AND ORECHOFF). 1935. The alkaloids of *Papaver* species. I. Alkaloids of *Papaver armeniacum* and *Papaver orientale*. (Ger). Ber. Deutsch. Chem. Ges. 68: 2158-2163. 384 B45.

Chemical characteristics.

0937. KONOVALOVA, R. A., S. YUNUSOV, and A. P. OREKHOV. 1937. Concerning the alkaloids of wild species of poppies. I. Alkaloids of *Papaver orientale* and *Papaver armeniacum*. (Rus). Zhurn. Obshch. Khim. (Leningrad) 7(12): 1791-1796. 385 Z6.

Chemical composition of the alkaloids.

0938. KONOVALOVA, R. A., S. YUNUSOV, and A. P. OREKHOV. 1937. On the alkaloids of the wild species of poppy. II. Alkaloids of *Papaver floribundum*. (Rus). Zhurn. Obshch. Khim. (Leningrad) 7(12): 1797-1802. 385 Z6.

Five new alkaloids were extracted and chemical formulas determined.

0939. KOOPMAN, M. J. F. 1963. Results of a number of storage experiments conducted under controlled conditions (other than agricultural seeds). Proc. Int. Seed Testing Assoc. 28: 853-860. 61.9 In84P.

Papaver seeds should contain no more than 5.5% moisture for reliable moisture-proof packing.

0940. KOOPMANS, A. 1955. A trisomic *Papaver rhoeas*. Genetica 28: 35-41. 442.8 G282.

Abnormal flowers of *P. rhoeas* which did not open by themselves contained one extra chromosome which behaved irregularily.

0941. KOOPMANS, A. 1956. Cytogenetical aspects within the genus *Papaver*. (Dutch). Genen en Phaenen 1(3): 5-7. 443.8 C282.

Relationships between *P. argemone*, *P. nigrotinctum*, *P. dubium* and *P. somniferum*.

0942. KOOPMANS, A. 1970. Species differentiation in *Papaver dubium*. New Phytol. 69(4): 1121-1130. 450 N42.

P. dubium seeds collected in several European countries had seedlings of 2 different chromosome numbers, 2n = 42, the most widespread and 2n = 28. The latter had 4 races of which 2 should be considered subspecies.

0943. KOOPMANS, A. 1970. Preliminary notes on crosses between *Papaver dubium* L. (2n = 42) and *P. rhoeas* L. (2n = 14). Acta Bot. Neerl. 19(4): 533-534. 450 Ac822.

The leaf shapes of the F_1 of *P. dubium* x *P. rhoeas* were variable while in the reciprocal cross they were less variable and smaller. Chromosome studies give support for the hybrid origin of *P. dubium*.

0944. KOPERZHINSKII, V. V., and V. V. SHEBERSTOV. 1956. Intake and distribution of labeled phosphorus applied to the opium poppy through the leaves. (Rus). Dokl. Akad. Nauk SSSR 106(6): 1061-1064. 511 P444A.

Labeled phosphorus applied to upper leaves was translocated all through the plant. However, one application to the soil was a much more efficient method.

0945. *KOPP, E. 1943. Data on the anatomy of ripe poppy capsules. Kiserl. Kozlem. 46: 286.

Three types of poppy capsules described: oil poppies, opium poppies and alkaloid poppies.

0946. *KOPP, E. 1957. Researches on the development of a morphine-rich opium strain. (Ger). Pharmazie 12: 614-620. LC: RS1 P673.

Types of opium poppy are richest which have few but large capsules with large blue-gray seeds. In Rumania seeds are sown in early April. Morphine content largely conditioned by climatic factors, best results attained in warm but not too humid weather.

0947. KOPP, E. 1960. Green opium poppy or poppy straw (ripe opium poppy capsules)? (Ger). Pharmazie 15(1): 40-41. LC: RS1 P673.

From an economic viewpoint it is better to produce morphine from ripe poppy capsules than from immature plants.

0948. KOPP, E., and E. KOTILLA. 1955. Experiments on improving the alkaloid poppy. (Rum; summ. Rus and Fr). Stud. Cercet. Sti. (Cluj) Ser. 2, 6(3/4): 57-60. 512 B8523.

Breeding experiments have increased the morphine content by 30% in Rumania. Important factors are cross pollination, varieties with blue seeds, time of sowing and the amount of rain during the growing season.

0949. KOPP, E., E. KOTILLA, M. BUCUR, M. PETER, and Z. KISGYÖRGY. 1962. Gravimetric determination of morphine in the form of a morphine-molybdenum-vanadium complex compounds. (Ger). Pharmazie 17: 46-48. LC: RS1 P673.

A method for determining morphine in poppy capsules.

0950. KOPP, E., E. KOTILLA, and K. CSEDO. 1959. Microchemical determination of the morphine content of ripe poppy capsules by means of a nephelometric method. (Ger). Pharmazie 14: 263-265. LC: RS1 P673.

This method measures the turbidity produced on adding ammonium molybdate and vanadate. The accuracy is not very great but it is simple and suitable for selecting alkaloid-rich strains in breeding work.

0951. KOPP, E., E. KOTILLA, K. CSEDO, and S. MATYAS. 1961. Further attempts at breeding a poppy variety rich in alkaloids. (Ger). Pharmazie 16(4): 224-231. LC: RS1 P673.

In selecting for high morphine content, plants with the highest as well as those with the lowest contents should be discarded since high amounts lead to degeneration and a decrease of morphine in the progeny.

0952. KORDAKOV, I. A. 1966. Cultivation of poppy and its alkaloid content under the humid climate of southeast Kazakhstan. (Rus). Trudy Bot. Inst., Akad. Nauk Kaz. SSR 22: 153-170. 451 A163.

Varieties of *P. somniferum* cultivated for their oil content have qualitatively the same alkaloids which can be increased 5-9% by fertilizing with N and P.

0953. KORDAKOV, I. A. 1967. Dynamics of ascrobic acid in various sorts of early ripening poppies. (Rus). Izv. Akad. Nauk Kaz. SSR, Ser. Biol. Nauk 2: 21-24. 442.8 AL63.

Early ripening poppies had more ascorbic acid then late ripening ones.

0954. KORDAKOV, I. A., and L. K. KLSYHEV. 1970. Effect of growth conditions on N metabolism in oilseed poppy cv. Novinka 198. (Rus). Trudy Bot. Inst., Akad. Nauk. Kaz. SSR 28: 154-160. 451 AL63.

The maximum content of N was at the 6- to 12-leaf stage and the minimum at seed maturity. Fertilizers increased the N in the whole plant from 5 to 5.5%.

0955. KORI, S., and M. KONO. 1961. The chromatographic analysis of opium alkaloids. IV. Quantitative separation of codeine or hydrocodeine from ephedrine or methylephedrine. (Jap; summ. Eng). J. Pharm. Soc. Japan 81: 728-732. 396.9 P49.

0956. KOROHODA, J., and I. MICZULSKA. 1962. A trial of taking advantage of heterosis in breeding and seed production of poppy. (Pol; summ. Eng and Rus). Pamietn. Pulawski 5: 5-14. 64.9 In7.

Hybridization of 4 varieties showed that the effect of heterosis was most conspicuous when the parents differed only slightly in respect to given features.

0957. KORSAK, A. 1951. Changes in soil moisture in orchards under various cover crops. (Pol; summ. Rus and Eng). Ann. Univ. Mariae Curie-Sklodowska, Sect. E 6(8): 253-282. 512 L96Ae.

Poppy used as a cover crop allowed the best growth, yield and resistance to winter injury for apples because the trees received more moisture than with other crops.

0958. KOS, J., and V. VUKCEVIC-KOVACEVIC. 1970. Determination of noscapine in mixture containing 2-etoxybenzamide, p-acetaminophenol, phenobarbitone and 5-phenyl-2-imino-4-oxo-oxazolidine. Bull. Sci. Cons. Acad. RPF Yougoslavie, Sect. A. 15(1-2): 8-9. Q1 A1A3.

0959. KOSMATH, L. 1927. Studies on the tapetum in anthers. (Ger). Osterr. Bot. Z. 76(3): 235-241. 450 Os7.

In P. rhoeas the inner walls of the tapetum are cutinized while in Chelidonium majus they are not.

0960. KOTHARI, K. L. 1966. Mildews that might mar your opium poppy. Indian Farming 16(7): 23-24. 22 In283.

Symptoms of downy mildew and powdery mildew are described and control measures are given.

0961. KOTHARI, K. L. 1968. Other powdery mildew on opium poppy (Papaver somniferum L.). Indian Phytopath. 21: 456. 464.8 In2.

Oidiopsis sp.

0962. KOTHARI, K. L., and N. PRASAD. 1970. Downy mildew of opium poppy in Rajasthan. Indian Phytopath 23: 674-688. 464.8 In2.

Peronospora arborescens attacks poppy plants either infecting the entire plant severely or causing leaf spots. Most effective control is a soil drench of Dithane Z-78 to check oospore infection.

0963. KOTHARI, K. L., and A. C. VERMA. 1967. Control of downy mildew of opium poppy by root application of fungicides. Pl. Dis. Reporter 51(8): 686-687. 1.9 P69P.

Fungicides Bis-D, ferbam and zineb are translocated within the plant and partially control Peronospora arborescens.

0964. KOTHARI, K. L., and A. C. VERMA. 1972. Germination of conidia of poppy powdery mildew (Erysiphe polygoni DC.). Mycopathol. Mycol. Appl. 47(3): 253-260. 450 M994.

Conidia germinated at all relative humidities from 0-100%; on all substrates tested, being highest (89.41%) on 2% agar; maximum temperature for germination 32.5°C; optimum near 20°C; light and darkness did not affect germination.

0965. KOTTE, W. 1948. Injuries caused by the poppy capsule weevil, Ceutorrhynchus maculá alba Hrbst. (Ger). Z. Pflanzenkrankh. 55: 81-85. 464.8 Z33.

The weevils appear at flowering, the eggs are laid in the capsule where the young grubs feed on septa and seeds.

0966. KOTTE, W. 1948. Severe infestation of poppy root weevil, Stenocarus (Coeliodes) fuliginosus Marsh. in southwest Germany. (Ger). Z. Pflanzenkrankh. 55: 287-288. 464.8 Z33.

0967. KOUBA, R. 1968. Poppy seed intoxication. (Czech). Prakt. Lekar. 48: 207-209. MAM: W1 PR242.

0968. KOULA, V. 1965. Studies on the effect of herbicidal aerosols on the transpiration intensity of some weeds and cultivated plants. (Czech; summ. Rus, Eng and Ger). Ochr. Rostl. 1(2): 17-24. 464.8 Oc3.

At 5.5 kg/ha, cold aerosol applications of 10% butyl esters of some 2,4-D, MCPA and 2,4,5-T reduced the rate of transpiration in some plants including poppies.

0969. KOULA, V. 1968. A study on symptoms of injury to cultivated plants caused by herbicide aerosols. (Czech; summ. Rus and Eng). Pol'nohospodarstvo 14: 185-194. 19.5 P752.

Descriptions are given of the injuries to crops by aircraft applied aerosols containing 2,4-D and MCPA. Poppies were greatly injured by 2,4-D.

0970. KOVACHEVSKY, I. C. 1966. Yellow bean mosaic of poppy. (Ger; summ. Rus and Eng). Nachrichtenbl. Deutsch. Pflanzenschutzdienst 20(1): 7-8. Univ. Calif. Gen. Libr., Berkeley.

The virus, Marmor manifestum, observed on poppy in Bulgaria can be transmitted to bean and broadbean by means of pressed poppy sap and by Doralis fabae, as well as artificial infections of poppy plants from beans naturally infected.

0971. KOVACHEVSKY, I. C. 1968. Bean yellow mosaic virus in Bulgaria. (Ger; summ. Eng). Phytopathol. Z. 61: 41-48. 464.8 P562.

The virus is transmissible mechanically or by the aphid Doralis fabae from diseased poppy to bean and vice versa.

0972. KOVACS, A. I., and C. MALLEGNI. 1970. Weed control in winter wheat with trifluralin in Italy. Proc. 10th British Weed Control Conf. 1970: 56-62. 79.9 B77.

Post-emergence applications of 0.668 or 0.89 kg/ha gave good control of broadleaf weeds including P. rhoeas.

0973. KOVACS, P. 1970. Transamination of phenylalanine, aspartic acid and ornithine in poppy seedlings, *Papaver somniferum* L. (Ger; summ. Eng). Biol. Pl. 12(1): 6-10. 450 B52.

The changes caused by enzymatic transamination of these 3 amino acids were studied in 5-7 day old poppy seedlings germinated in darkness or light.

0974. KOVACS, P. 1970. Enzymes in the metabolism of amino acids. V. On the separation of the transaminases of L-phenylalanine, L-aspartate and L-ornithine obtained from poppy seedlings (*Papaver somniferum* L.). (Ger; summ. Eng and Czech). Biologia (Bratislava) 25(6): 359-364. LC: QK1 B52.

Enzymes obtained from 5-day old light-germinated seedlings.

0975. KOVACS, P., and A. JINDRA. 1965. Biosynthesis of alkaloids. On the oxidative deamination of biogenetically important amino acids in *Papaver somniferum* plants. Naturwissenschaften 52(13): 395-396. 474 N213.

Deamination of amino acids by phenoloxidase prepared from leaves of *P. somniferum*.

0976. KOVACS, P., and A. JINDRA. 1965. Biosynthesis of alkaloids. On the transformation of tyrosine to 3,4-dihydroxyphenylalanine in *Papaver somniferum* L. plants. Experimentia 21(1): 18-19. 475 Ex7.

Demonstrated by experiments *in vitro* with acetone powders of roots.

0977. KOVACS, P., A. JINDRA, and M. PSENAK. 1966. Biochemistry of alkaloid synthesis in poppies. Phenolase complex in *Papaver somniferum* L. (Ger). Abh. Deutsch Akad. Wiss. Berlin, Kl. Chem. 1966(3): 335-340. 509 D482.

There was an increase in diphenol oxidase activity after 2 days in sprouting poppy seedlings; simultaneously the main alkaloids appeared.

0978. KOVACS, P., A. JINDRA, M. PSENAK, and Z. PITTNEROVA. 1964. Enzymic reactions in the biosynthesis of opium alkaloids. Int. Congr. Biochem. 6(5): 442. 386.2 In84A.

Enzymes involved in various reactions.

0979. KOVACS, P., M. PSENAK, and A. JINDRA. 1963. Biosynthesis of alkaloids. VII. Phenolase-complex activity of germinating poppies. (Hung; summ. Rus). Herba Hung. 2: 145-154. Mirabeau Lamar Libr., Univ. of Texas, Austin, Texas.

Tyrosine oxidase activity was low in germinating *P. somniferum* seedlings. Pyrocatechol oxidase and dopa oxidase increased during the first 3 days and then showed little change.

0980. KOVACS, P., M. PSENAK, and A. JINDRA. 1964. Biosynthesis of alkaloids. IX. Phenolase complex in the poppy plants (*Papaver somniferum* L.). (Czech; summ. Rus, Eng and Ger). Cesk. Farm. 13(4): 179-181. MAM.

Tyrosine and dihydroxyphenylalanine oxidase were studied in various organs of the plant as to their role in alkaloid synthesis.

0981. KRAFT, D. 1953. A simple field method for alkaloid determination. (Ger). Pharmazie 8(2): 170-173. LC: RS1 P673.

By means of a special pressure pliers, a few drops of plant juice may be removed from the leaf of a plant (e.g. *Papaver*) and tested for alkaloids. The size and color of the spot can give quantitative information on the amount in the plant.

0982. KRASIN, A. YA. 1951. On the vernalization of (*Papaver somniferum*) and (*Salvia sclarea*) seeds. (Rus). Bjull. Glavn. Bot. Sada B 8: 67-69. 451 M854.

0983. KRATOCHVIL, J., and J. ZAKOPAL. 1948. Diseases of the poppy in 1943. (Czech; summ. Rus). Ochr. Rostl. 21: 26-37. 464.8 Oc3.

Boron deficiency caused browning of the leaves and dieback. *Peronospora arborescens* was restricted to certain districts. *Coeliodes fuliginosus* and *Ceutorrhynchus macula-alba* were widespread. The gall-forming insects *Aulax papaveris* and *A. minor* deformed the poppy heads.

0984. KRAUSE, A., and P. METENIOWSKI. 1966. On the differential catalytic behavior of several opium alkaloids. (Ger). Pharmazie 21(6): 378-379. RS1 P673.

Morphine, narcotine, papaverine and codeine.

0985. KRISHNA, S., and H. CHAUDHURI. 1927. A preliminary report on injection experiments with special reference to the production of alkaloids and general metabolism in plants. J. & Proc. Asiat. Soc. Bengal 23(3): 335-338. SI.

Injection of collodial iron into seedlings appeared to reduce berberine in the opium poppy and increase it in the red poppy which normally contains no berberine.

0986. KRISHNASWAMI, S., S. MITHULINGAM, and V. S. RAMAN. 1968. Cytomorphological observations in garden populations of poppy. S. Indian Hort. 16(3/4): 51-55. 80 So825.

_P_. _alpinum_, _P_. _rupifragum_, _P_. _orientale_ and _P_. _somniferum_ are cytologically stable. Diploid, triploid and tetraploid plants of _P_. _nudicaule_ occur, the triploid more vigorous with more flowers. In comparison, _P_. _rhoeas_ var. Orange Gem showed significant inbreeding depression.

0987. KRITIKOS, P. G., and S. P. PAPADAKI. 1967. The history of the poppy and of opium and their expansion in antiquity in the eastern Mediterranean area. Bull. Narc. 19(3): 17-38. LC: HV5800 B8.

Poppy and opium among the ancient Greeks as portrayed by classical texts and archaeological discoveries.

0988. KROEBER, L. 1946. The production of morphine and opium in Germany. (Ger). Pharmazie 1: 314-318. LC: RS1 P673.

Cultivation and varieties best suited for Germany. Extraction of capsules for morphine is more favorable than from opium.

0989. KRUEGER, H., N. B. EDDY, and M. SUMWALT. 1941-1943. The pharmacology of the opium alkaloids. I. Morphine. II. Other alkaloids. U.S. Public Health Suppl. 165: 1-1448.

A thorough review of the pharmacological literature on opium and its derivatives, especially morphine. The extensive bibliography contains 9174 items plus an addendum.

0990. KRUSE, K. 1962. The poppy. (Ger). Apothekenhelferin 10(12): 94-95. 396.8 Ap42.

Its use as a drug plant.

0991. KRZESZKIEWICZ-MAJEWSKA, W. 1962. The manurial value of peat composts. (Pol; summ. Rus and Eng). Roczn. Nauk Roln., Ser. A, Rosl. 86: 627-644. 20.5 R59.

With poppies, NH_4NO_3 gave much better growth as measured by production of dry matter, than composted peat.

0992. KRZYMANSKI, J. 1966. Constitution of oils from home-grown oil-yielding plants. (Pol; summ. Rus and Eng). Hodowla Rosl. 10(5): 535-546. 64.8 H66.

Fatty acid composition was determined for a number of oil plants. P. somniferum is rich in linolic acid but lacking in linolenic acid.

0993. KÜHN, L., and S. PFEIFER. 1963. The genus Papaver and its alkaloids: a review. Pharmazie 18(12): 819-843. LC: RS1 P673.

The alkaloids of 35 species that have been studied for their alkaloid content are reviewed.

0994. KÜHN, L., and S. PFEIFER. 1965. Alkaloids of the genus Papaver. VIII. Papaver fugax Poir., P. triniaefolium Boiss., P. persicum Lindl., P. polychaetum Schott & Kotschy. (Ger). Pharmazie 20(8): 520-521. LC: RS1 P673.

The alkaloids found in each of these species are given.

0995. KÜHN, L., and S. PFEIFER. 1966. Alkaloids of genus Papaver. XIX. Isolation of porphyroxine, salutaridine, (-)-N-methylcrotonosine, and glaziovine from Papaver caucasicum Marsch.-Bieb. (Ger). Pharmazie 22(1): 58-59. LC: RS1 P673.

0996. KÜHN, L., S. PFEIFER, J. SLAVIK, and J. APPELT. 1964. On the alkaloids of Papaver caucasicum Marsch.-Bieb. (Ger). Naturwissenschaften 51: 556. 474 N213.

0997. KUHN, V. 1936. Morphology, biology and biochemistry of poppy. (Czech and Ger). Sborn. Ceskoslav. Akad. Zemed. 11: 243-254. 19.5 C332C.

The composition of the latex varies greatly and is influenced by the age of the plants, amount of water in the soil and weather conditions.

0998. KUIZENGA, J. 1960. A new method for planting of opium poppy and other plant seeds. (Dutch). Landbouw Mechanisatie 11(11/12): 778-781. 58.8 L2352.

Mechanical method for planting small seeds.

0999. KUNTH, C. S. 1837. A botanical note. (Ger). Arch. Naturgesch. 3: 231-234. 410 Ar2.

Papaver compared with Glaucium and Argemone in seed characters.

1000. KUPUSTINSKII, A. F. 1950. Antibiotic properties of poppy blossoms. (Rus). Priroda 39(7): 68. 410 P933.

Antibiotic substances have been extracted from P. somniferum flowers which are active against human pathogens such as Micrococcus luteus and Mycobacterium citreum and against fungus diseases of plants caused by Peronosporaceae.

1001. KURCAY, A. 1946. The role and importance of Turkish varieties for opium poppy growing. (Turk). Cankaya Matbaasi, Ankara No. 6: 1-48. NAL Film 1024.

Classification of P. somniferum and its polymorphic characters as exhibited in vars. genuinum, stipitatum, officinale and hussenottii; areas of cultivation; and main botanical characters, as found in Turkey and some other countries.

1002. KUSEVIC, V. 1960. Determination of the origin of opium by visible or ultraviolet spectrophotometry. (Fr). Ann. Pharm. Franc. 18: 706-710. 396.8 An7.

1003. KUSEVIC, V. 1960. Cultivation of the opium poppy and opium production in Yugoslavia. Bull. Narc. 12(2): 5-13. LC: HV5800 B8.

Cultural practices with emphasis on the harvest of opium and governmental control.

1004. KUSHAKOV, F. 1963. Irrigation of opium poppy during flowering and maturity stages. (Rus). Kolkhoz.-Sovkhoz. Proizodstvo Kirgizii 6: 22-23. 20 Se493.

For opium production in Tian-Shan region.

1005. KÜSSNER, W. 1940. Alkaloid content of poppy capsules. (Ger). E. Merck's Jahresber 54: 29-40.

Comparison of 9 varieties for alkaloids and seed yield in Germany.

1006. KÜSSNER, W. 1961. Poppy straw: a problem of international narcotics control. Bull. Narc. 13(2): 1-6. LC: HV5800 B8.

Poppies grown for seed only should not be subject to the same control measures as those grown for opium. Poppy capsules should be regarded as a drug but both capsules and straw are virtually useless as a raw material for illegal opiate manufacturers.

1007. KUZIN, A. M., and V. I. MERENOVA. 1954. Biosynthesis of opium alkaloids, tagged with radioactive carbon. (Rus). Biokhimiya 19(5): 616-618. 385 B523.

Morphine, codeine and narcotine studied in _P._ _somniferum_.

1008. KUZ'MINA, L. M. 1966. Anomalous seed forms of the poppy (_Papaver_ _nudicaule_ L.). (Rus). Bot. Zhurn SSSR 51(4): 557-559. 451 R923.

Seeds of this species have deviations from the usual curved shape; a straight ovule produces a spindle-shaped seed. In addition, some seeds germinate during the milk stage.

1009. KUZMINA, N. E. 1937. Cytology of the cultivated poppy in connection with its origin and evolution. (Rus). Trudy Prikl. Bot., Ser. 2, Genet. Rast. 8: 81-92. 451 R92G.

Chromosome study of various subspecies with size measurements.

1010. KUZMINSKA, K. 1966. Influence of nitrogen fertilization on the morphine and codeine content in the opium poppy. (Pol; summ. Eng). Prace Komis. Nauk Roln. Lesn. 20(1): 129-145. 20.5 P872.

In pot culture, there was an increase in capsular morphine and codeine with an increase in N, and nitrate was superior to ammonium. Maximum morphine was observed in the mature green capsule, while maximum codeine appeared immediately after bloom.

1011. KUZMINSKA, K. 1969. Biosynthesis of alkaloids during the ontogeny of _Papaver_ _somniferum_ L. (Pol). Wiad. Bot. 13(4): 249-257. 450 W632.

A review of alkaloids in various parts of the plant, changes during plant growth and site of biosynthesis.

1012. KUZMINSKA, K. 1970. The interdependence of boron fertilizing and crops of _Papaver_ _somniferum_ L. as well as morphine and fat content. (Pol; summ. Rus and Eng). Herba Polon. 16(2): 142-148. 451 P87.

Production of capsules and seeds increased significantly with the addition of low doses of boron but were suppressed with high doses. Fat content showed a slight increase with boron.

1013. KVASHNINA, E. S. 1928. Preliminary report of the survey of diseases of medicinal and industrial plants in North Caucasus. (Rus; summ. Ger). Izv. Kraev. Stan. Zashch. Rast. 4: 30-46. 423.92 Se8.

Oidium _erysiphoides_ on _P._ _somniferum_ in USSR.

1014. LAGNEAU, F., and P. GALLARD. 1946. Intoxication of cattle by poppy. (Fr). Rec. Med. Vet. 122(7): 310-313. 41.8 R24.

A discussion of symptoms and treatment of cattle following ingestion of leaves and stalks of P. somniferum (var. setigerum).

1015. LAIBACH, F. 1962. Further investigations on the withering of poppy flowers. (Ger). Beitr. Biol. Pflanzen 37(1): 1-12. 450 C66.

Petal-fall of P. rhoeas was accelerated by proximal treatment of fruit nodes or distal treatment of the corolla with alpha-naphthyleneacetic acid paste. Gibberellic acid and kinetin did not cause withering.

1016. LAUMONT, P. 1941. Some useful oil plants. (Fr). Bull. Inspect. Gen. Agric. Alger. 51: 1-4. 24 AL34.

Cultivation methods for 4 possible oil crops for Algeria, including P. somniferum var. candidum.

1017. LAWRENCE, M. J. 1965. Variation in wild populations of Papaver dubium. I. Variation within populations. Diallel crosses. Heredity 20(2): 183-204. 443.8 H42.

A study of the inheritance of flowering-time have shown that in each of the 5 population samples investigated there were considerable amounts of both additive and non-additive genetic variation and that populations differed in respect to both.

1018. LAWRENCE, M. J. 1969. Variation in wild populations of Papaver dubium. II. Variation between populations. Heredity 24(3): 337-346. 443.8 H42.

Inheritance of flowering time is determined by genes with both additive and non-additive properties.

1019. LAWRENCE, M. J. 1972. Variation in wild populations of Papaver dubium. III. The genetics of stigmatic ray number, height and capsule number. Heredity 28(1): 71-90. 443.8 H42.

Samples from 5 natural populations of P. dubium showed genetic variation within populations for stigmatic ray numbers and final height but not for capsule number.

1020. LEAKE, H. M., and B. R. PERSHAD. 1920. A preliminary note on the flower colour and associated characters of the opium poppy. J. Genet. 10(1): 1-22. 442.8 J823.

Studies of the genetic factors involved in inheritance of color in petals and seed.

1021. LEAKE, H. M., and B. R. PERSHAD. 1922. The coloration of the testa of the poppy seed (*Papaver somniferum*). J. Genet. 12(3): 247-249. 442.8 J823.

Three genetic factors are involved in seed color and there is a correlation with petal color.

1022. LECAT, P. 1955. On various methods of vernalization of poppy (*Papaver somniferum* L.). (Fr). Compt. Rend. Hebd. Seances Acad. Sci. 241: 1984-1986. 505 P21.

Vernalization in cold distilled water advanced flowering 8-10 days.

1023. LECAT, P. 1956. Improvement of morphine content in poppy (*Papaver somniferum nigrum* L.) by genetical selection. Influence of mineral fertilizers on this content. (Fr). Ann. Pharm. Franc. 14(11): 714-718. 398.8 An7.

Mineral fertilizers have little, if any, effect on the morphine content of poppy capsules. Moderate doses of N significantly increases the weight of seeds and capsules per hectare.

1024. LECAT, P. 1959. Effect of spraying maleic hydrazide and potassium sulfate on morphine content of capsules of poppy. (Fr). Acad. Agric. France, Compt. Rend. 45(12): 592-594. 14 P215Bc.

Spraying foliage with a combination of maleic hydrazide (2 parts/1,000) and potassium sulfate (1 part/100) increased morphine production without deforming the capsule.

1025. LECAT, P. 1960. Effect of gibberellin on the opium poppy. (Fr). Bull. Soc. Bot. France 107: 317-318. 451 F84B.

Gibberellin did not affect the weight of the capsule but caused further development of the integument of the capsule with reduction of the weight of the seed and morphine content.

1026. LECAT, P. 1961. Influence of some physiological actions on the biogenesis and migration of morphine in opium poppy pods. Bull. Soc. Franc. Physiol. Veg. 7: 43-44. 451 So193.

Seeds held 35 days at 2° or 3°C and 3% humidity gave plants having heavier seed but 10-15% less morphine. Seeds held 8 days at 30°C in a solution of $CaCl_2$ and KCl gave plants flowering 2-3 days later with smaller seeds but 15-25% more morphine.

1027. LEE, C. K., and H. K. KIM. 1970. Investigation into the geographical differences in alkaloid content of Korean opium. Bull. Narc. 22(2): 41-46. LC: HV5800 B8.

Dates of poppy sowing, fertilizing, flowering and lancing are given for various regions of Korea as well as the alkaloid content of the opium produced. Morphine, codeine, and noscapine are higher in Korean samples than in those from other countries reported in the literature and can be used as a basis for determining its origin.

1028. LEETE, E. 1958. Biogenesis of morphine. Chem. & Ind. Lond. 31: 977-988. 382 M31C.

Labeled tyrosine is an efficient precursor of morphine in _P. somniferum_.

1029. LEETE, E., and J. B. MURRILL. 1964. Incorporation of dopamine into chelidonine and morphine. Tetrahedron Lett. 3: 147-151. 385 T29.

Labeled dopamine fed to _P. somniferum_ plants was incorporated into morphine.

1030. LEGER, L. 1895. Researches on the vegetative organs of Papaveraceae Juss. (Fr). Mem. Soc. Linn. Normandie 18: 195-623.

An anatomical study, including the Fumariaceae, of the vegetative organs and laticiferous system of the Papaveraceae.

1031. LEIKOLA, E., and U.-M. ALHOPURO. 1962. Use of spray drying to isolate the active components of certain drugs. (Ger). Farm. Aikakauslehti 71(6): 213-224.

From _P. somniferum_ the content of morphine varied from 0.9 to 1.3%.

1032. LELLIOTT, R. A., and M. M. WALLACE. 1955. A bacterial disease of Shirley poppies in Tanganyika. Trans. Brit. Mycol. Soc. 38(1): 88-91. 451 B76.

The disease affects P. rhoeas and can be transmitted to P. orientale by artificial inoculation. The name Pseudomonas papaveris is proposed.

1033. LEMONNIER, L.-C. 1838. To give the characters of the family of Papaveraceae, and to study the story of the species which are employed in Medicine. (Fr). pp. 3-15. In L.-C. Lemonnier, Questions sur diverses branches des sciences medicales. Paris Theses 244. MAM.

Characters of Papaver and Papaveraceae, history of opium use, the chemical composition of opium and the medicinal action of the different alkaloids are given.

1034. LE MAOUT, E., and J. DECAISNE. 1876. A general system of botany. (Transl. by Mrs. Hooker). 2 vols. Longmans, Green, and Co., London. 1066 pp.

An excellent text with descriptions and illustrations of the orders, with an outline of morphology, anatomy and physiology. Papaveraceae are treated on pp. 214-218.

1035. LENCHES, O. 1968. On the position of native poppy cultivation and the factors which affect their development. (Hung; summ. Rus and Ger). Herba Hung. 7(1): 11-15. 71.8 H413.

Agrotechnical development and use of effective plant pesticides are necessary for increasing production.

1036. LENDNER, A. 1946. Some cases of teratology in the Rhoeadineae and reflections on the systematics of the order. (Fr). Rev. Hort. Suisse 19(7): 161-164. 80 R3212.

Teratological characters in P. nudicaule include ovules borne on a gynophore, sepals which persist after flower opening, 4 green petals and a whorl of long foliaceous organs enclosing sterile stamens.

1037. LESTIBOUDOIS, T. 1823. On the fruits of the Papaveraceae. (Fr). Recueil Trav. Soc. Sci. Lille 1823: 181-194. LC: 46 L7.

Comparison of fruits of various genera.

1038. LESTIBOUDOIS, T. 1823. On the silique fruits. (Fr). Recueil Trav. Soc. Sci. Lille 1823: 194-207. LC: 46 L7.

Comparison of the fruits of Cruciferae and Papaveraceae.

1039. LETERRIER, F., and B. VIOSSAT. 1967. Production of free radicals in some alkaloids of the poppy by chemical methods. (Fr). Compt. Rend. Hebd. Seances Acad. Sci. Ser. C 265: 410-412. 505 P21.

1040. LEWANDOWSKA, I., and I. SOKOLOWSKA. 1968. Chromatographic separation and determination of alkaloids in the pantopon type drugs. Diss. Pharm. Pharmacol. 20(1): 81-86. MAM: PO 257J.

A simple and convenient method for precise determination and identification of different alkaloids in drugs.

1041. LEWIS, A. 1968. Historical perspective. Brit. J. Addict. 63(3/4): 241-245. MAM.

Opium, cannabis and cocaine have a long and colorful history. The problems raised 50-100 years ago are the same as today and comparisons are made.

1042. LEWIS, H. L. 1928. Variations in _Papaver_ _argemone_. J. Northamp. Nat. Hist. Soc. 24(193): 128. LC: QH1 N86.

Variations noted in the field.

1043. LEZY, ___. 1946. Intoxication of cattle by capsules of the field poppy. (Fr). Rec. Med. Vet. 122(1): 23-24. 41.8 R24.

Cows which had ingested capsules (free of seeds) and stalks of _P_. _somniferum_ var. _setigerum_ with a feed of chopped beets and straw showed in 2 hours cerebrospinal excitation.

1044. LIEFSTINGH, G. 1971. New developments in the cultivation of poppy seed. (Dutch). Bedrijfsontwikkeling (Akkerbouw) 2(3): 79-83. SB13 B4.

Pre-emergence application of 40% asulam gave good weed control with seed yields equivalent to hoed plants. Precision drilling with pelleted seed also gave good yields.

1045. LIEFSTINGH, G., P. N. PANDE, and R. SIJTSMA. 1971. Asulam for weed control in opium poppy (*Papaver somniferum*). (Dutch; summ. Eng). Meded. Fac. Landbouwwetensch. Rijksuniv. Gent 36(3): 1257-1269. 105.1 G344.

Selectivity and weed control was satisfactory with post-sowing applications of asulam in field experiments.

1046. LIEHR, O. 1919. The culture and uses of poppy. (Ger). Fühlings Landw. Zeitung 68: 191-198. 18 F95.

The yield, composition, quality and uses of poppy oil and the by-product, poppy cake, are discussed.

1047. LIGNIER, O. 1911. Anatomical notes on the ovary of some Papaveraceae. (Fr). Bull. Soc. Bot. France 58: 279-283, 337-344, 429-435. 451 F84B.

Anatomy of *Platystemon*, *Meconella*, *Platystigma*, *Eschscholtzia*, *Glaucium* and *Chelidonium*.

1048. LIND, J. 1913. Danish fungi as represented in the herbarium of E. Rostrup. 648 pp. 462 L642D.

Peronospora arborescens on *Papaver somniferum*, *P. rhoeas*, *P. dubium* and *P. argemone*. (p. 63).

1049. LIND, J. 1928. The micromycetes of Svalbard. Skrifter om Svalbard og Ishavet (Kgl. Dept. Handel, Sjofart) 13: 1-61. 462 L642M.

A list of 10 fungi found on *P. radicatum* herbarium material collected on Spitsbergen and Bear Island, including a new species *Lophodermidium svalbardense*.

1050. LINDMAN, C. A. M. 1964. Nordens flora II. Wahlstrom & Widstrand, Stockholm. pp. 223-437. 459.1 L63.

The Papaveraceae are given on pp. 228-232 and include *P. dubium* and *P. radicatum*.

1051. LINDTNER, V. 1950. Smuts of Yugoslavia. (Croat). Glasn. Prir. Muz. Srpske Zemlje, Ser. B, Biol. Nauke 3/4: 5-110. 510 Y9G.

Entyloma fuscum has been collected on *P. somniferum*, *P. dubium* and *P. rhoeas*.

1052. LISOVSKII, G. M. 1957. Anomalies in the structure of the perianth in *Papaver somniferum* L. (Rus). Bot. Zhurn. 42(8): 1282-1285. 451 R923.

A variety with 3, 5 and 8 petals had larger plants and higher seed yield than a variety with 3 and 5 petals.

1053. LJUNGDAHL, H. 1924. Origin of the chromosomes that conjugate in meiosis in *Papaver* hybrids. (Ger). Svensk Bot. Tidskr. 18(2): 279-291. 450 Sv2.

Two crosses were studied, *P. nudicaule* (n = 7) x *P. radicatum* (n = 35) and *P. nudicaule* x *P. nudicaule* var. *striatocarpum* (n = 35). In the F_1 of both hybrids n = 21. A backcross with *P. nudicaule* resulted in n = 14.

1054. LOBIK, A. I. 1914. Parasitic fungi collected in the summer of 1912-1913 in the vicinity of Cholm, government Pskow. (Rus; summ. Ger). Bolezni Rast. 8(2/3): 74-89. 464.8 Z6.

Peronospora arborescens on *Papaver somniferum* in USSR.

1055. LONA, F., and A. BOCCHI. 1956. Vegetative and reproductive development of some long-day plants in relation to the effect of gibberellic acid. (Ital; summ. Eng). Nuovo Giorn. Bot. Ital. 63(4): 469-486. 450 N92.

Plants of *P. somniferum*, kept at long-day conditions in the field, were potted and changed to short-day. The half treated with gibberellic acid on the apex flowered 15 days before the untreated controls.

1056. LONDNER, M. V., F. A. ZACCARA, J. C. BALLINA, G. R. BOTTONI, and J. O. COMBA. 1969. Urease and arginase activity in seeds of Argentine plants. (Span). Cienc. Invest. 25(10): 247-470. 475 C482.

Arginase activity was found in *P. somniferum* seeds but not urease.

1057. LÖÖF, B. 1966. Poppy cultivation. Field Crop Abstr. 19(1): 1-5. 241 C73.

A general literature review of all aspects of poppy culture.

1058. LÖÖF, B. 1966. Cultivation technique for poppy. (Swed; summ. Eng). Sveriges Utsadesforen. Tidskr. 76(2/3): 213-224. 61.9 Sv23.

Varieties bred for high seed yield gave higher yields of morphine under Swedish conditions than the "morphine varieties" of southeastern Europe and Asia. Poppy is a difficult crop unless soil preparation, sowing and harvest are carried out with care.

1059. LÖÖF, B., and R. JÖNSSON. 1965. Cultivation technique for poppy. (Swed.) Svenska Frötidn. 4: 51-54. 61.8 Sv2.

Cultivation, including row spacing, hoeing, fertilizing, harvesting and fat content of the seeds.

1060. LORENZ, K. K. 1945. The 1945 oriental poppy season. Fl. Grower 32: 438-439, 452-453. 80 M72.

Description of new varieties and their flowering in an Ohio test garden.

1061. LORENZ, K. K. 1947. New oriental poppies. Fl. Grower 34: 707, 728-731. 80 M72.

Descriptions of new varieties and their flowering in an Ohio garden.

1062. LORENZ, K. K. 1948. Care of oriental poppy. Horticulture 26: 237, 250. 80 H787.

Garden cultivation.

1063. LORINCZ, G., and P. TETENYI. 1963. Results of our experiments in interspecific hybridization in *Papaver*. (Hung). Herba Hung. 2: 127. Univ. Texas Libr.

The F_1 crosses between *P. orientale* and *P. somniferum* showed both intermediate and new morphological types and fell into 17 groups on the basis of alkaloid composition.

1064. LORINCZ, G., and P. TETENYI. 1966. Distant hybridization between *Papaver somniferum* and *P. orientale*. (Rus; summ. Hung and Ger). Herba Hung. 5(1): 95-105. 71.8 H413.

Compared to F_1, heterosis effect was noted in the F_2 with respect to the morphine, codeine and thebaine contents and in the F_3, with respect to narcotoline, narcotine and papaverine.

1065. LORINCZ, G., and P. TETENYI. 1970. Results of poppy breeding of the method of crossing taxonomically distant varieties. (Hung; summ. Rus, Ger, and Eng). Herba Hung. 9(3): 79-87. 71.8 H413.

Breeding *Papaver somniferum* and *P. orientale* varieties for morphine content.

1066. LOSA ESPANA, D. M. 1944. Contributions to the mycological flora of Gallega. (Span). Anales Jard. Bot. Madrid 4: 195-240. 451 M262.

Peronospora arborescens on *Papaver somniferum* in Spain.

1067. LÖVE, A. 1955. Cytotaxonomical remarks on the Icelandic *Papaver*. Nytt. Mag. Bot. 4: 5-18. 450 N99.

An extensive treatment of the Iceland species of *Papaver* Sect. *Scapiflora*, including morphology, chromosome numbers, key and descriptions of new species and subspecies.

1068. LÖVE, A. 1962. Nomenclature of North Atlantic Papavers. Taxon 11: 132-138. 450 T192.

The nomenclature for the 4 North Atlantic species of *Papaver* (*P. radicatum*, *P. dahlianum*, *P. nordhagenianum* and *P. cornwallisense*) is summarized.

1069. LÖVE, A., and D. LÖVE. 1948. Chromosome numbers of northern plant species. Iceland Univ. Inst. Appl. Sci., Dept. Agric. Rep. Ser. B 3: 1-131. 11 R33.

Chromosome numbers of Papaveraceae including *Papaver* spp. are given on pp. 56-57.

1070. LÖVE, A., and D. LÖVE. 1961. Chromosome numbers of central and northwest European plant species. Opera Bot. 5: 1-581. 450 Op 22

Papaveraceae numbers (including *Papaver*) are given on pp. 171-173.

1071. LÖVE, D. 1969. *Papaver* at high altitudes in the Rocky Mountains. Brittonia 21(1): 1-10. 450 B77.

Discusses the three species of *Papaver* Sect. *Scapiflora* which grow at high altitudes south of the Yukon.

1072. LÖVE, D., and N. J. FREEDMAN. 1956. A plant collection from SW Yukon. Bot. Not. 109(2): 153-211. 450 B656.

Five new species of Papaver are described.

1073. LÖW, I. 1924. Die Flora der Juden. Vol. II. Wien and Leipzig. 532 pp. LC: QK378 L6.

Papaveraceae (pp. 363-373) include P. hybridum, P. officinale, P. polytrichum, P. rhoeas and P. somniferum.

1074. LUBIMENKO, V. N., and O. A. SZEGLOVA. 1928. Photoperiod adaptation of plants. (Fr). Rev. Gen. Bot. 40(477): 513-536. 450 R326.

A number of plants were exposed to varying daylengths and the production of dry matter was measured. A full day length of 16 hours of light was most effective for P. nudicaule.

1075. LUNDSTROM, E. 1923. On Papaver nudicaule L. and P. radicatum Rottb. in Fennoscandia and the Arctic and on some related species. (Ger). Acta Horti Berg. 7: 403-430. 451 Sw3.

The differences between the 2 species are given and several new species and subspecies are described.

1076. MAAS GEESTERANUS, H. P. 1958. Withering disease and false mildew of Papaver somniferum. (Dutch). Wageningen Inst. Plantenziekund. Onderzoek., Jaarv. 1958: 80-83. 464.9 W163J.

In the Netherlands, Helminthosporium papaveris on poppy is controlled with seed treatment of either captan or thiram.

1077. MAAS GEESTERANUS, H. P. 1960. A premature ripening of seed poppies. (Dutch; summ. Eng). Tijdschr. Planteziekten 66(2): 107-110. 464.8 T44.

Application of Syntox before flowering reduced premature death of poppies at the end of their vegetative period. This suggests it may have been a virus infection or aphid damage.

1078. MAAS GEESTERANUS, H. P. 1960. Pyrenophora calvescens on seed poppies (Papaver somniferum). (Dutch). Tijdschr. Planteziekten 66(4): 237-248. 464.8 T44.

Pyrenophora calvescens attacks only dying tissues, the main infection occurring after the crop is cut, when weather conditions are bad for drying.

1079. MACCALLUM, E. P. 1928. Twenty years of Persian opium (1908-1928). Opium Research Committee, Foreign Policy Association, New York. 55 pp. LC: HV5840 P4M3.

Persian attempts at controlling poppy cultivation under international pressure and possible substitute revenue sources.

1080. MACGOWAN, D. J. 1859. Note on Chinese opium. Trans. China Branch Roy. Asiatic Soc. 6: 41-47.

History of the cultivation of poppy and the use of opium in China.

1081. MACHT, D. I. 1915. The history of opium and some of its preparations and alkaloids. J. Amer. Med. Assoc. 64: 477-481. 448.9 Am37.

Opium may have been referred to in the Old Testament but the first authentic reference to the milky juice of poppy was by Theophrastus at the beginning of the third century B.C. The earliest mention of opium in India was by Barbosa in 1511. Early preparations that included opium are given.

1082. MACMILLAN, H. F. 1946. Tropical Gardening and Planting. Ed. 5. MacMillan Co., London.

Opium poppy (p. 361) is divided into var. *glabra*, which furnishes medicinal opium and is grown mainly in Turkey and Persia, and var. *alba*, cultivated in India and China, and is used for eating, drinking and smoking.

1083. MADUENO BOX, M., and M. G. SERRANILLOS. 1942. A contribution to the study of opium in Spain. (Span; summ. Ital, Ger, Fr and Eng). Farmacognosia Anal. Madrid 1: 149-159. 396.8 F222.

A study of the possibilities of cultivating the opium poppy in Spain showed that calcium superphosphate and potassium sulphate have no effect on the opium yield or on its morphine percentage.

1084. MAGNUS, P. 1893. The Peronosporales of the Province of Brandenburg. (Ger). Verh. Bot. Vereins Prov. Brandenburg 35: 55-87. 451 B73V.

Peronospora arborescens found on *Papaver somniferum* in the Berlin University Garden.

1085. MAHEAS, M. R. DE. 1968. Pretreatment of plants for extraction of organic nitrogen compounds. (Fr). Fr. Addn. 92,070. 4 pp. U.S. Patent Office.

The yield of alkaloids extracted from poppies was increased by initial aerobic fermentation of the pulverized material by _Alternaria_ spp.

1086. MAHESHWARI, J. K. 1963. The Flora of Delhi. Council of Scientific & Industrial Research, New Delhi. 447 pp. SI: QK358 M21.

Papaveraceae (pp. 55-56) include _P_. _somniferum_.

1087. MAHESHWARI, N. 1958. _In_ _vitro_ culture of excised ovules of _Papaver_ _somniferum_. Science 127: 342. 470 Sci2.

Excised ovules starting from the 2-celled proembryo stage developed into mature seeds after 23 days culture on Nitsch's medium to which kinetin and IAA had been added.

1088. MAHESHWARI, N., and M. LAL. 1961. _In_ _vitro_ culture of excised ovules of _Papaver_ _somniferum_ L. Phytomorphology 11(3): 307-314. 450 P566.

Casein hydrolysate greatly promoted the _in_ _vitro_ growth of the excised ovules.

1089. MAHESHWARI, P., and K. KANTA. 1962. Intraovarian pollination in _Eschscholzia_ _californica_ Cham. and _Papaver_ _rhoeas_ L. pp. 146-153. _In_ Plant Embryology. A symposium held at the Univ. of Delhi, 1960. Council of Scientific and Industrial Research. New Delhi, India. 163.42 Sy6.

Pollen in a suspension of boric acid was injected into the ovary and seedlings from the fertilization were grown.

1090. MAHESHWARI, P., and K. KANTA. 1964. Control of fertilization. pp. 187-193. _In_ Linskens, H. F. (Ed.). Pollen physiology and fertilization. North-Holland Publ., Co., Amsterdam. 451 In87.

Pollen suspension injected into the ovaries of emasculated flowers of _P_. _somniferum_ effected fertilization. The ovules followed the same pattern of growth as in nature, developing into normal capsules and viable seeds, although the number of seeds was less.

1091. MAHESHWARI, S. C., and M. M. JOHRI. 1963. Respiration in the developing ovules of poppy (Papaver somniferum L.). Naturwissenschaften 50(23): 718-719. 474 N213.

Four peaks of oxygen uptake occurred: (1) at fertilization, (2) free nuclei formation, (3) cell wall formation in the endosperm, (4) period of rapid cell division in the embryo.

1092. MAIRE, R. 1932. Contributions to the study of the flora of North Africa. (Fr). Bull. Soc. Hist. Nat. Afrique N. 23(7): 163-222. 410.9 Sol25.

On p. 164 a new variety is described, P. somniferum L. ssp. setigerum (DC.) Briq. var. coccineum Maire.

1093. MAIRE, R. 1954. Flora of North Africa (Morocco, Algeria, Tunisia, Tripolitania, Cyrenaica, and Sahara). XL. Dicotyledonae: Ranales: Rhoeadales, Papaveraceae, sf. Papaveroideae, Hypecoideae. (Fr). Encycl. Biol. 63: 5-332, 152 illus.

Diagnoses, keys and descriptions for Papaveraceae, with some new names proposed in Papaver.

1094. MAJEWSKY, F., W. MAJEWSKA, and Z. JANISZEWSKA. 1969. Boron fertilization needs. II. Utilization of boron by snap beans, red beets and poppies depending on soil type and reaction. (Pol; summ. Rus and Eng). Roczn. Nauk Roln., Ser. A, Rosl. 95(4): 545-565. 20.5 R59.

Poppies showed boron deficiency symptoms on podzolic and muck soils and symptoms appeared only in treatments with lime, without the addition of boron.

1095. MALER, J. 1966. On the large-scale technology of harvesting the poppy. (Czech). Za Vysokou Urodu 14(10): 377-379. 64.8 Z12.

Agrotechnical considerations for the cultivation of poppy.

1096. MALHEIROS-GARDE, N. 1950. Some effects of morphine on mitosis in Luzula purpurea Link. (Span; summ. Eng). Genet. Iber. 2: 29-38. 443.8 G28.

Morphine concentrations of 0.1-0.5% induced both polyploidy and fragmentation in the chromosomes.

1097. MALIK, C. P., and I. S. GROVER. 1971. Failure of chromosome pairing in opium poppy (Papaver somniferum). Z. Biol. 116(6): 472-480. 442.8 Z3.

One plant from a normal population of P. somniferum showed high pollen abortion. Analysis of the meiosis suggests a mutation for desynapsis.

1098. MALIN, A. 1907. Investigation of ripe and unripe poppy capsules for their alkaloid content. (Ger). Ber. Deutsch. Pharm. Ges. 17: 60-61. 396.9 D48.

Young capsules have a higher % of morphine than ripe ones while narcotine and codeine are higher in the ripe ones.

1099. MALININA, V. 1968. More extensive use of high yielding oil poppy. (Rus). Zernovye Maslich. Kul't. 10: 39-40. SB183 Z4.

Various high-yield cultivars were tested for morphine and oil content.

1100. MANDELBAUM, A., and D. GINSBURG. 1964. Mass spectra of the opium alkaloids. Israel J. Chem. 2(5a): 245. 385 Is7.

1101. MANDY, G. 1970. SB morphic poppy. Acta Agron. Acad. Sci. Hung. 19: 171-172. 19 Ac8.

Details are given of this blue-seeded poppy variety which has relatively low cultural requirements but high productivity and morphine content.

1102. MANN, I., H. DÖHNERT, and S. PFEIFER. 1966. Alkaloids of the genus Papaver. XVI. Isomerization of isorhoeadine, papaverrubine A and alpinigenine. (Ger). Pharmazie 21: 494-495. LC: RS1 P673.

1103. MANN, I., and S. PFEIFER. 1966. Red-colored alkaloids of the genus Papaver. IX. Isolation and structure of papaverrubine F. (Ger). Pharmazie 21(11): 700. LC: RS1 P673.

From P. oreophilum.

1104. MANN, I., and S. PFEIFER. 1967. Alkaloids of the genus Papaver. XX. Structure of oreoline and N-methyloreoline. (Ger). Pharmazie 22(2): 124. LC: RS1 P673.

Isolated from P. oreophilum.

1105. MARCHESETTI, C. DE. 1896. Flora di Trieste e de Suoi dintorni. Trieste. 727 pp. SI: QK316 M316.

The Papaveraceae are given on pp. 18-20 and include _P. rhoeas_, _P. argemone_ and _P. somniferum_.

1106. MARCHIONATTO, J. B. 1923. Contribution to the knowledge of parasitic fungi of cultivated plants. (Span). Revista Fac. Agron. Univ. Nac. La Plata III 15(2): 83-92. 9 R32.

Entyloma fuscum on _P. somniferum_ in Argentina.

1107. MARIANI, A., and O. M. MARELLI. 1959. Separation of opium alkaloids by alumina plate chromatography. (Ital; summ. Fr, Eng and Ger). Rendiconti Ist. Super. Sanita 22(8-9): 759-763. 449.9 R66.

With this method it is possible to separate clearly 5 opium alkaloids in 15 min. Turkish and Indian samples can be differentiated.

1108. MARIE-VICTORIN, FR. 1964. Flore Laurentienne. (2nd Edition of 1947, revised by E. Rouleau). University of Montreal Press, Montreal. 925 pp. SI: QK203 Q4M33.

The Papaveraceae are given on pp. 246-248 and include _P. rhoeas_.

1109. MARIKOVSKII, P. I. 1970. _Messor aralocaspius_ and its keeping in captivity. (Rus; summ. Eng). Zool. Zhurn. 49(8): 1158-1166. 410 P92.

Favorite food is poppy seeds.

1110. MARKGRAF, F. 1953. Morphological-phylogenetical study of the flowers of Cruciferae and Papaveraceae. (Ger). Proc. 7th Int. Bot. Congr. 1950: 352-354. 451 C769R.

Comparative floral morphology of the Papaveraceae and Cruciferae. The flowers of _Dicentra_ and _Hypecoum_ are homologous with those of the Cruciferae.

1111. MARKGRAF, F. 1953. Morphological-phylogenetical study of the flowers of the Rhoeadales. (Ger). Proc. 7th Int. Bot. Congr. 1950: 857-858. 451 C769R.

The flowers of _Dicentra_ and _Hypecoum_ are homologous with those of Cruciferae; _Sanguinaria_ shows analogies with _Pteridophyllum_. Consequently, the Rhoeadales are related to the Berberidaceae.

1112. MARKGRAF, F. 1958. In G. Hegi, Illustrierte flora von Mittel-Europa. 2nd Ed. Carl Hanser, Munich. 4(1): 1-547. SI: QK281 H46.

Detailed descriptions are given on pp. 29-49 for P. alpinum and its subspecies, P. rhoeas, P. dubium, P. hybridum, P. argemone and P. somniferum.

1113. MARKS, G., and W. K. BEATTY. 1971. "The plant of good and evil" - Opium, pp. 3-28. In G. Marks and W. K. Beatty, The medical garden. Charles Scribner's Sons, New York. RS81 M3.

The history of the early use of opium, the isolation of morphine, addiction, particularly among writers, and the introduction of heroin are briefly discussed.

1114. MARTIN, A. 1946. The comparative internal morphology of seeds. Amer. Midl. Nat. 36: 513-660. 500 Am3.

Papaver embryos are of the linear type, varying in size; P. dubium is relatively small, P. somniferum is large with P. orientale intermediate in size.

1115. MARTIN, R. O., M. E. WARREN, JR., and H. RAPOPORT. 1964. Reticuline as the benzyltetrahydroisoquinoline precursor of thebaine in biosynthesis with carbon-14 dioxide. J. Amer. Chem. Soc. 86(21): 4726-4727. 381 Am335.

Labeling pattern of alkaloids, after immediate extraction from plants exposed to radioactive carbon dioxide, gave evidence that reticuline was the precursor of thebaine.

1116. MARTIN, R. O., M. E. WARREN, and H. RAPOPORT. 1967. The biosynthesis of opium alkaloids. Reticuline as the benzyltetrahydroisoquinoline precursor of thebaine in biosynthesis with carbon-14 dioxide. Biochemistry 6(8): 2555-2563. 381 B523.

1117. MARTINEK, V. 1962. The application of heterosis in poppy. (Czech; summ. Rus and Eng). Ved. Prace Instr. Vyzk. Ustavu. Rostl. Vyroby Praze-Ruzyni 6: 9-25. 195 C3332.

A hybrid between the varieties Hanacky Modry and Detenicky Belosemenny named Hybrid HD yielded 15-20% higher seed crop. The method of seed production of the hybrid is given in detail.

1118. MARTINEZ, M. 1959. Plantas utiles de la Flora Mexicana. Ediciones Botas, Mexico. 621 pp. 452.8 M364.

Brief description of the cultivation of P. somniferum for morphine and P. orientale as an ornamental.

1119. MARY, N. Y., and E. BROCHMANN-HANSSEN. 1968. Quantitative determination of the principal alkaloids of opium by thin-layer chromatography. Lloydia 26(4): 223-228. 442.8 L77.

A sensitive and rapid method for the quantitative determination of morphine, codeine, thebaine, papaverine and narcotine in opium.

1120. MASALAB, N. A. 1938. Diseases of medicinal and of some industrial plants caused by species of Sclerotinia. (Rus). Sovetsk. Bot. 1938(5): 67-83. 450 So8.

Sclerotinia sclerotiorum found on opium poppy in Crimea.

1121. MASSA, L. 1942. The opium poppy (Note on a first culture of the ornamental in Italian East Africa). (Ital). Agr. Colon. 36: 102-104. 26 Ag62.

Production of opium poppy in Italian East Africa.

1122. MASSICOT, J. 1959. New data on the characterization and the determination by paper chromatography of alkaloids derived from piperidine. (Fr). Bull. Soc. Chim. France 1959: 1825-1828. 383 P21B.

Method for determining alkaloids in quantities less than 1 mg.

1123. MASSICOT, J. 1961. Biosynthesis of alkaloids in poppy seedlings. (Fr; summ. Eng and Ger). Ann. Pharm. Franc. 19(1): 44-52. 396.8 An7.

Quantitative estimation of alkaloids in the first 8 days of growth of P. somniferum seedlings shows that alkaloids are synthesized by the whole plant and not only by the root. In plants treated with morphine, the codeine content increases.

1124. MASURAT, G., and S. STEPHAN. 1963. The occurrence of the most important diseases and pests of agricultural and horticultural plants in 1962 in the territory of the German Democratic Republic. (Ger). Nachrichtenbl. Deutsch. Pflanzenschutzd. n.s. 17: 185-215. 464.9 N11.

Peronospora arborescens and Helminthosporium papaveris are serious diseases of opium poppy in Germany.

1125. MATSUI, D., S. AKAGI, and F. UGAI. 1962. Chemical constituents of the alkaloid-free fraction from opium. Chem. Pharm. Bull. 10(9): 872-875. RM1 C5.

A number of sterols were isolated.

1126. MATSUMOTA, T., and S. HIRANE. 1941. On the causal organism of a bacterial soft rot of poppy in Formosa. (Jap; summ. Eng). Trans. Nat. Hist. Soc. Formosa 31: 1-13. SI: 506.529 N28.

The bacillus isolated from opium poppies infected with soft rot was generally identical with *Bacillus aroideae* isolated from radish. However, the serological and bacteriophagal characters differ greatly.

1127. MATSUMURA, J. 1904. Index plantarum japonicarum. Enumeratio plantarum omnium, Cryptogamae. Tokioni. 439 pp. 460.15 M423I.

Peronospora arborescens on *Papaver somniferum* in Japan.

1128. MATSUURA, H. 1933. A bibliographical monograph on plant genetics, 1900-1929. 2nd Ed., Sapporo, Japan. 409 pp. 463.6 M42.

A review of inheritance of petal color in *P. rhoeas* and *P. somniferum* is given on pp. 266-272. Other characters are discussed.

1129. MATUROVA, M., B. K. MOZA, J. SITAR, and F. SANTAVY. 1962. Isolation of alkaloids from several *Papaver* species. VI. Isolation of alkaloids from several *Papaver* species of section *Scapiflora* Reichb. (Ger; summ. Eng). Pl. Med. 10: 345-358. 450 P697.

The 6 morphologically similar species and subspecies studied were similar also in the alkaloids they contained. Most had protopine, rhoeadine, muramine, xanthopetaline and an unknown.

1130. MATUROVA, M., D. PAVLÁSKOVA, and F. SANTAVY. 1966. Isolation and chemistry of alkaloids of several *Papaver* species. XXXIV. Isolation of alkaloids from several *Papaver* species. (Ger; summ. Eng). Pl. Med. 14(1): 22-41. 450 P697.

Identification of 25 alkaloids isolated from P. *oreophilum*, *P. nudicaule*, *P. pyrenaicum*, *P. alpinum*, *P. suaveolens* and *P. aculeatum*.

1131. MATUROVA, M., H. POTESILOVA, F. SANTAVY, A. D. CROSS, V. HANUS, and L. DOLEIS. 1967. Isolation and chemistry of the alkaloids from some plants of the genus Papaver. XXXVI. The structure of the alkaloids alpinine and alpinigenine isolated from Papaver alpinum L. Coll. Czech. Chem. Commun. 32: 419-425. 385 C68.

1132. MATUROVA, M., V. PREININGER, and F. SANTAVY. 1968. Isolation and chemistry of alkaloids of the genus Papaver. XLIV. Identification of alkaloids of the 13-oxoprotopine type present in some plants of the genus Papaver. (Ger; summ. Eng). Pl. Med. 16(2): 121-126. 450 P697.

Isolated from P. hispidum.

1133. MATZNER, F. 1957/1958. The influence of fertilizing with chlorides and sulphates in conjunction with calcium on the yield and seed quality of poppy (Papaver somniferum L.) in relation to infection by Helminthosporium papaveris according to Henning. (Ger). Wiss. Z. Friedrich-Schiller Univ. Jena, Math.-Naturwiss. Reihe 7: 295-303. 509 J41.

Addition of KCl to a loess soil resulted in heavy infestation of the fungus; K_2SO_4 had no effect and lime reduced losses considerably.

1134. MAYOR, E. 1921. Mycological notes. (Fr). Bull. Soc. Neuchateloise Sci. Nat. 46: 3-40. SI: 506.494 S68.

Erysiphe polygoni and Peronospora arborescens on Papaver somniferum in Switzerland.

1135. MAYOR, E. 1958. List of Peronosporales, Taphrinales, Erysiphaceae, Ustilaginales and Uredinales of the Canton of Neuchatel, Switzerland. (Fr). Mem. Soc. Neuchateloise Sci. Nat., Mem. 9(1): 1-202. 462.12 M45.

Erysiphe communis is found on all parts of the opium poppy; Peronospora arborescens only on the stems and leaves.

1136. MCCLEAN, A. P. D., and S. M. COWIN. 1952-1953. Diseases of crucifers and other plants caused by cabbage black ring-spot virus. S. Africa Dept. Agric. Sci. Bull. 332: 1-30. 24 So84S.

The virus attacks P. nudicaule, P. rhoeas and is fatal to P. somniferum where it produces a rapid, lethal, systemic necrosis.

1137. MCCLURE, D. S. 1957. Seed characters of selected plant families. Iowa State J. Sci. 31: 649-682. 470 IO9.

External and internal characteristics of seeds of Papaveraceae briefly summarized on pp. 671-673.

1138. MCDONALD, A. 1896. The poppy and opium in Persia. Amer. J. Pharm. 1896: 435-438. 396.8 Am3.

Cultivation of poppy giving details of irrigation, sowing of the seed, harvesting the opium and preparation for the market.

1139. MCGUIRE, T. A., C. H. VAN ETTEN, F. R. EARLE, and F. R. SENTI. 1957. Use of ion exchange in recovery and partial purification of morphine from aqueous extracts of poppy capsules. J. Amer. Pharm. Assoc. Sci. Ed. 46(4): 247-248. 396.9 Am35J.

1140. MCKENNA, P. J. 1946. Oriental poppies can be good mixers. Home Gard. 8(2): 59-62. 80 H756.

Garden cultivation.

1141. MCNAUGHTON, I. H. 1960. Internal breeding barriers in Papaver. Scott. Plant Breeding Sta. Rep. 1960: 76-84. 10 Sco86.

Chromosome numbers are reported for 6 Papaver species. Intraspecific crosses gave high seed yields while interspecific crosses were usually sterile.

1142. MCNAUGHTON, I. H., and J. L. HARPER. 1960. The comparative biology of closely related species living in the same area. I. External breeding-barriers between Papaver species. New Phytol. 59(1): 15-26. 450 N42.

Although 5 British species of Papaver frequently occur together, flower over the same general period and share common insect visitors, hybrids are rare under natural conditions. Natural hybridization is deterred by mechanisms facilitating self-pollination and species selectivity by the principal pollinator, the honey bee.

1143. MCNAUGHTON, I. H., and J. L. HARPER. 1960. The comparative biology of closely related species living in the same area. II. Aberrant morphology and a virus-like syndrome in hybrids between Papaver rhoeas L. and P. dubium L. New Phytol. 59(1): 27-41. 450 N42.

The highly variable hybrids are not intermediate between the parents and show 3 intergrading classes: (1) forms which die in rosette stage from apical die-back, (2) forms which lose apical dominance, becoming bushy with distorted leaves and flower buds (resembling certain virus syndromes) and (3) forms which retain apical dominance, producing small open flowers which are both male- and female-sterile, in numbers higher than parents.

1144. MCNAUGHTON, I. H., and J. L. HARPER. 1960. The comparative biology of closely related species living in the same area. III. The nature of barriers isolating sympatric populations of Papaver dubium and P. lecoqii. New Phytol. 59(2): 129-137. 450 N42.

Despite morphological and taxonomic similarities, the 2 species have gene exchange barriers operating at 3 levels: (1) the ability of the parents to self-pollinate, (2) ill-adapted hybrids and (3) the extreme infertility of F_1 hybrids.

1145. MCNAUGHTON, I. H., and J. L. HARPER. 1964. Papaver L. J. Ecol. 52(3): 767-793. 450 J829.

Five British poppies, P. rhoeas, P. dubium, P. lecoqii, P. argemone and P. hybridum are compared ecologically for habitat, communities, responses to biotic factors, gregariousness, morphology, phenology, floral biology, parasites, diseases and history.

1146. MEFFERT, M.-E. 1949. Helminthosporiosis of the oil poppy. (Ger). Nachtrichtenbl. Deutsch. Pflanzenschutzd. n.s. 3: 104-106. 464.9 N11.

Helminthosporium papaveris on P. somniferum.

1147. MEFFERT, M.-E. 1950. The biology and morphology of the fungus causing leaf scorch of poppy. (Ger). Z. Parasitenk. 14: 442-498. 442.8 Z33F.

Helminthosporium papaveris.

1148. MEHLISCH, K. 1935. A leaf disease of the Dahlia. (Ger). Blumen-Pflanzenbau & Gartenwelt. 39: 390-391. 80 G196.

To control Entyloma fuscum on P. somniferum a 1% Bordeaux solution is recommended.

1149. MEHLTRETTER, C. L., and F. B. WEAKLEY. 1957. Extraction of morphine from poppy capsules and its recovery by ion exchange. J. Amer. Pharm. Assoc. Sci. Ed. 48(3): 193-196. 396.9 Am33J.

Extraction from dried poppy capsules.

1150. MEISSNER, L. 1966. Biochemistry of latex. X. Latex pH and its meaning with regard to the nature of the latex. (Ger). Flora (Jena), Abt. A 156(4): 404-410. QK710 F5.

Latex pH values of 28 plant species, including P. orientale and P. somniferum, were weakly acid, and in most instances lower than those of the corresponding leaf homogenates.

1151. MEISSNER, L. 1966. Biochemistry and physiology of latexes. XII. RNA and protein content of isolated latexes and incorporation of radioactively labeled amino acids in latex proteins. (Ger; summ. Eng). Flora (Jena), Abt. A 156(6): 634-654. QK710 F5.

Ribosomal particles are present in the latex of *P. somniferum* but there is no incorporation of radioactive amino acids into protein of isolated latex. There was, however, synthesis *in vivo*.

1152. MEISSNER, L. 1966. Biochemistry of latex. XIII. The gaseous metabolism of isolated milky juices. (Ger). Flora (Jena), Abt. A 157(1): 1-26. QK710 F5.

P. somniferum was among 28 species of plants from 8 genera, containing latex-type exudates which were shown to exhibit weak endogenous evolution of gas, attributed to phenolases and spontaneous oxidations.

1153. MEISSNER, L., and K. MOTHES. 1964. Biochemistry of latexes. VII. Metabolic activity in the latex of *Papaver somniferum*. (Ger; summ. Eng). Phytochemistry 3(1): 1-6. 450 P5622.

The latex from unripe capsules of *P. somniferum* was exceptional among several types of latex studied, in showing endogenous gas exchange, *in vitro* incorporation of labeled amino acids in the protein fraction and alkaloid synthesis.

1154. MELCHERS, L. E. 1931. A check list of plant diseases and fungi occurring in Egypt. Trans. Kansas Acad. Sci. 34: 41-106. 500 K13T.

Peronospora arborescens on *Papaver somniferum*, p. 59.

1155. MELLOR, E. M. 1923. The countries our drugs come from. VI: India. Pharm. J. 110: 297-298 & 337-340. 396.8 P49.

Opium is mentioned in a discussion of crops of India.

1156. MELVILL, J. C. 1919. Teratology in *Papaver orientale*. J. Bot. 57: 226. 450 J82.

A brief note on the occurrence of a gamopetalous corolla.

1157. MELVILLE, R. 1941. Cultivation and food value of the oil poppy. Gard. Chron. 109: 54. 80 G162.

General article on the possibilities of cultivation in England for seed and oil.

1158. MELZER, F. 1929. Malaria, Gold und Opium: mit Stotzners Hei lung kiang - Expedition in die unerforschte Mandschurei. Leipzig. 222 pp.

A Manchurian travelogue, with popular notes on agriculture and anthropology.

1159. MERINO, R. P. B. 1905. Flora descriptiva e illustrada de Galicia. I. Santiago. 620 pp. SI: 581.946 M562.

Papaveraceae (pp. 92-98) include _P_. _argemone_, _P_. _hispidum_, _P_. _rhoeas_ and _P_. _dubium_.

1160. MICHAELS-NYOMARKAY, K. 1966. Distribution of some alkaloids and amino acids in the organs of two morphine poppy varieties (SB, SD) during ontogenesis. (Hung; summ. Rus and Ger). Gyogyszereszet 10(2): 56-62. MAM.

The seed contained minute amounts of cotarnoline and narceine but no morphine. Seedlings contained considerable thebaine. Alkaloids accumulated in stems and leaves during bud formation while at flowering accumulation shifts to the reproductive organs. A decrease occurs during seed maturation.

1161. MICHAELS-NYOMARKAY, K. 1970. Relationship between amino acid and alkaloid formation in poppy seedlings. (Hung; summ. Rus and Ger). Herba Hung. 9(1): 43-49. 71.8 H413.

Tyrosine levels fluctuate like alkaloids in 3- to 19-day old poppy seedlings with peak values for both in 3-day radicles. Seed coats, comprising 62% of the seed, contain no alkaloids, but narceine, thebaine, papaverine and narcotine are detectable in the endosperm and embryo.

1162. MICHAELS-NYOMARKAY, K. 1970. Study of alkaloid formation in poppy seedlings by means of radioactive isotopes. (Hung; summ. Rus and Ger). Herba Hung. 9(2): 85-91. 71.8 H413.

Labeled tyrosine and acetate were incorporated into the poppy alkaloids. Sodium acetate appeared to increase alkaloid synthesis.

1163. MICHALOWSKI, J. 1881. Beitrag zur Anatomie und Entwickelungsgeschichte von Papaver somniferum L. Inaug. Diss., Univ. Breslau, Gratz. 52 pp. 463.5 M582.

Describes seeds, endosperm, embryo, development of the shoot and root.

1164. MICHALSKI, T. 1959. Polyploidization of medicinal poppies, Papaver somniferum L. (Pol; summ. Ger). Biul. Inst. Roslin. Leczniczych. 5(1): 63-67. 451 P87.

Colchicine treatment of P. somniferum by various methods was not successful in inducing polyploidy.

1165. MICHALSKI, T. 1960. Effect of ionizing radiation on morphine content of poppies (Papaver somniferum L.). (Pol; summ. Ger). Biul. Inst. Roslin. Leczniczych. 6(2): 169-175. 451 P87.

Seeds of poppy were irradiated with Co^{60} and the resultant mutations were of 4 types: dwarfs, flower color changes, sterile flowers, and biochemical changes (primarily increased morphine content).

1166. MICHNA, M., and J. SZWADIAK. 1964. Effect of boron and nitrogen fertilizing upon the crop and the morphine content in poppyheads of Papaver somniferum L. variety 'Niebieski K. M.'. (Pol; summ. Rus and Eng). Biul. Inst. Roslin. Lecznichzych. 10(2-3): 138-145. 451 P87.

In pot experiments, B combined with NPK gave the highest yields and morphine content.

1167. MICZULSKA, I. 1967. Investigation on the effect of infestation of poppy (Papaver somniferum L.) with parasitic fungi on the content of morphine in the poppyheads. (Pol; summ. Eng and Rus). Roczn. Nauk Roln. Ser. A, Rosln. 93: 189-195. 20.5 R59.

Increasing infestation of poppyheads with Alternaria tenuis and Cladosporium herbarum resulted in a decline in morphine. Of 10 varieties tested, 'Swedish Blue' showed the highest resistance.

1168. MICZULSKA, I. 1967. Heterosis effect in hybrids of certain varieties of poppy (Papaver somniferum L.). (Pol; summ. Rus and Eng). Roczn. Nauk Roln., Ser. A, Rosln. 93: 197-204. 20.5 R59.

Hybrids in which the paternal parent was Bulgarian Blue Seed Poppy showed increased seed yield in the F_1 and the morphine content was either intermediate between both parents or exceeded them.

1169. MIKA, E. S. 1955. Studies on the growth and development and morphine content of opium poppy. Bot. Gaz. 116: 323-339. 450 B652.

Plants of Yuma poppy, USDA No. 17 (P. somniferum), grown under normal greenhouse conditions were compared with plants grown under controlled temperatures and photoperiods.

1170. MILATOVIC, I. 1949. A very dangerous disease of poppies - Pleospora. (Pleospora calvescens (Fr.) Tul.). (Croat). Biljna Proizvodnja 2: 136-140. 64.8 B49.

An important disease in Yugoslavia.

1171. MILATOVIC, I. 1952. A contribution to the biology of Pleospora calvescens (Fr.) Tulasne on poppy. (Croat; summ. Eng). Podjodjelska Znanstvena Smotra 13: 121-132. 21.5 Z13.

Helminthosporium papaveris and its perfect stage Pleospora calvescens are found on Papaver somniferum in Yugoslavia. The conidial stage is also found on P. rhoeas.

1172. MILKOVSKI, I., and I. POPIVANOV. 1969. Studies of some irrigated tobacco and cotton rotations. (Bulg; summ. Rus and Eng). Rasteniev. Nauki 6(2): 3-12. 64.8 R18.

Tobacco and cotton may be rotated with or without crops of lucerne, barley, peanuts and poppy.

1173. MILLIGAN, S., et al. 1921. Proceedings of the third meeting of mycological workers in India. Indian Board of Agriculture. Superintendent Government Printing, Calcutta. 45 pp. 464.9 In2.

The chief problem of poppy was infestation with Peronospora arborescens which was encouraged by the local method of storing seeds in earthen pots without aeration.

1174. MILORADOVICH, M. 1952. The home garden book of herbs and spices. Doubleday & Company, Inc., Garden City, N. Y. 236 pp. 97.21 M63.

In a brief discussion of growing poppy for seed for culinary uses, the author erroneously gives the species as Papaver rhoeas.

1175. MILOS, C. 1945. Quantitative determination of demerol and its separation from opium alkaloids. Amer. J. Pharm. 117(10): 343-346. 396.8 AM3.

1176. MILOS, C. 1961. Spectrophotometric assay of opium and paregoric. J. Pharm. Sci. 50: 837-839. 396.8 J825.

A method for routine analyses.

1177. MINISTRY OF AGRICULTURE, LONDON. (HOARE, A. H.). 1942. The cultivation of medicinal plants. Bull. Minist. Agric., Lond. 127: 1-27. 10 G794B.

Cultivation of poppy is included.

1178. MINKOV, S. 1964. Contribution to the dressing of the poppy crop. (Bulg; summ. Rus and Eng). Rasteniev. Nauki 1(1): 121-127. 64.8 R18.

On leached brown forest soil, fertilizers enhanced the height of plants by 16 cm and increased the number of capsules and seed.

1179. MINKOV, S. 1965. Study on the new poppy varieties P-360 and C-188 in Sandanski region. (Bulg; summ. Rus and Eng). Rasteniev. Nauki 2(8): 39-46. 64.8 R18.

Varieties have higher crude opium yields.

1180. MINZ, G. 1953. Plant parasitic nematodes. (Heb and Eng). Israel Agric. Res. Sta., Rehovot. 38 pp. 436 Is7.

Root-knot nematode, Meloidogyne sp. on P. somniferum in Israel.

1181. MIRAM, R., and S. PFEIFER. 1958. Paper chromatography of papaveraceous alkaloids. II. The analysis of poppy straw, opium and galenical preparations derived therefrom. (Ger). Sci. Pharm. 26(1/2): 22-40. MAM.

The procedure described is suitable for qualitative identification of most of the minor alkaloids of P. somniferum.

1182. MIRAM, R., and S. PFEIFER. 1959. The changes of the alkaloid content of the poppy plant during the period of vegetation. I. (Ger). Sci. Pharm. 27(1): 34-53. MAM.

The different organs of the plant were investigated separately for 6 alkaloids and the results tabulated. Very great fluctuations for different alkaloids in different organs were observed during development but also within a 24 hour period.

1183. MIRAM, R., and S. PFEIFER. 1960. The changes of the alkaloid content of the poppy plant during the period of vegetation. II. (Ger). Sci. Pharm. 28(1): 15-28. MAM.

In P. somniferum L. subsp. eurasiaticum var. coerulescens, narcotoline and narcotine were completely absent from the plant organs during the entire vegetative period.

1184. MISKO, L. A. 1963. Helminthosporiosis of poppy. (Rus). Zashch. Rast. Vredit. Bolezneij 8(10): 56. 421 Z1.

The yield of plants moderately infected with Helminthosporium papaveris was only half that of the non-infected. Applications of borate and manganese superphosphate increased plant resistance and so increased the yield.

1185. MIYAKE, K., and Y. IMAI. 1923. Genetic studies in the opium poppy (Papaver somniferum L.). I. On the flower color. (Jap). Bot. Mag. (Tokyo) 37(433): 1-13. 450 B651.

1186. MIYAKE, K., and Y. IMAI. 1927. Inheritance in Papaver somniferum. Proc. Imp. Acad. Japan 3(3): 169-170. 513 T576.

Flower color, petal serration, crapy corolla and smooth stalk were studied in hybrids.

1187. MIYAKE, K., and Y. IMAI. 1927. Genetic studies in the opium poppy (Papaver somniferum L.). II. On some characters other than the flower colour. (Jap; summ. Eng). Bot. Mag. (Tokyo) 41: 279-297. 450 B651.

Bristles on the flower stalk, crapy corolla, serrate petal and flower doubling exhibit much more variability in the segregating generation than expected.

1188. MIYAKE, K., and Y. IMAI. 1927. Genetic studies on Papaver somniferum. J. Coll. Agric. Imp. Univ. Tokyo 9(4): 275-332. 107.6 J27G.

Factors investigated in hybrids included flower color, flower doubleness, crinkling and serration of the petals and stem hairs. Genetic constitution of the common flower colors are given.

1189. MIYAKE, K., and M. TATEWAKI. 1935. Contributions to the flora of northern Japan V. Trans. Sapporo Nat. Hist. Soc. 14(1): 1-10. 410.9 Sa6.

Description of P. nudicaule L. subsp. xanthopetalum Fedde var. shimshirense Miyake & Tatewaki, var. nov. from Japan.

1190. MNATSAKANYAN, V. A., and S. YU. YUNUSOV. 1961. Alkaloids of wild-growing species of *Papaver* and *Roemeria*. (Rus). Dokl. Akad. Nauk Uzbeksk. SSR 3: 34-36. 511 Uzl.

The percent total alkaloids is given for 8 species of *Papaver* and 2 *Roemeria*. Papaverine was isolated from *P. commutatum*.

1191. MOESZ, G. 1938. Fungi of Hungary. II. Archimycetes and Phycomycetes. (Hung and Ger). Budapest Magyar Nemzeti Muz., Ann. Hist. Nat. Pars Bot. 31: 58-109. 410.9 B85A.

Peronospora arborescens on *Papaver somniferum* in Hungary.

1192. MOISIEV, R. K. 1964. Separation of oleiferous poppy alkaloids by means of chromatography in a thin-layer of silica gel. (Rus; summ. Eng). Apetchin Delo 13: 29-31. MAM.

Morphine, codeine, thebaine and papaverine were separated from the total alkaloid of poppy capsules.

1193. MOKRANJAC, M. ST., and M. BIRMANCEVIC. 1964. The effect of boron on the development of poppy. (Serb; summ. Fr). Acta Pharm. Jugoslav. 14: 73-84. LC: RS1 A28.

Boron was found to be essential for poppy growth and the minimum concentration was 0.05-3ppm.

1194. MOKRANJAC, M. ST., and M. BIRMANCEVIC. 1964. Action of boron on the production of morphine in poppy. (Serb; summ. Fr). Acta Pharm. Jugoslav. 14: 85-88. LC: RS1 A28.

The percentage morphine in dry poppy material was not influenced by the concentration of boron present in the nutrient solution.

1195. MÖLLER, F. W. 1971. *Macrosiphum stellariae* Theobald. A species previously undifferentiated from the green striped potato aphid, *Macrosiphum euphobiae* Thomas. (Ger; summ. Eng). Deut. Entomol. Z. 18(1/3): 207-215. 421 D48.

Both aphids attack *P. somniferum*.

1196. MOLLIARD, M. 1895. Researches on flower galls. (Fr). Ann. Sci. Nat. Bot. Ser VIII 1: 67-245. 450 An75.

If *Peronospora arborescens* attacks *Papaver rhoeas*, *P. argemone* or *P. dubium* while the buds are forming, the flowers dry before opening.

1197. MOLNAR, I. 1950. Vitamin B_1 and fat contents of poppy varieties. (Hung; summ. Rus and Eng). Agrartud. Egyet. Kert-Szoiogazdasagtud. Karanak Evk. 1: 18-20.

The vitamin B_1 content of the seeds of 3 poppy varieties varies between 197 and 286 gamma %, and the fat content was almost 50%.

1198. MONTORO GUARCH, A. 1935. Phytopathological contribution. (Span). Rev. Fac. Agron. Montevideo (Uruguay) 11: 9-24. 102.5 M76R.

Peronospora arborescens attacked Papaver somniferum but not P. rhoeas.

1199. MORASZ, S. 1958. Anomalies observed in the flowers of the blue poppy of Hatvan. (Hung; summ. Eng). Novenytermeles 7(4): 383-386. 64.8 N76.

Teratologies which occur in the flowers.

1200. MORASZ, S. 1966. Increasing the morphine content of poppy with controlled self-pollination. (Hung; summ. Ger). Herba Hung. 5(2/3): 127-130. 71.8 H413.

Eight years of selection of isolated self-pollinated plants increased the morphine content of the capsules from an average of 3.37% to 6.04%.

1201. MORASZ, S. 1967. Planting and spring care of poppy. (Hung). Magyar Mezogazd. 22(10): 22. 19 M27.

Details of field planting.

1202. MORI, A. DE. 1929. A new industrial plant: the white poppy. (Ital). La Terra 5(9): 560-562. 16 T27.

Note on P. somniferum album and its use for production of opium for medicinal use.

1203. MORICE, J., and J. LOUARN. 1971. Study of morphine content in the oil poppy (Papaver somniferum L.). (Fr; summ. Eng). Ann. Amelior Pl. 21(4): 465-484. 14 F8499A.

Despite variations caused by climatic factors, selections of lines high in morphine content can be made. This character shows no heterosis, F_1 hybrids being intermediate between the parents.

1204. MOROZOV, B. 1928. Survey of diseases of cultivated and useful ornamental plants in Stavropol district in 1927. (Rus). Stavropol. Stan. Zashch. Rast. Vred., Izv. 4: 32-49. 423.92 St2.

Peronospora arborescens is frequent in some districts on poppy.

1205. MOSCOSO, R. M. 1943. Catalogus florae Domingensis. Parte I. Spermatophyta. New York. 732 pp. SI: QK231 D6M89.

Papaveraceae (p. 204) include P. rhoeas.

1206. MOTHES, K. 1961. Alkaloids in poppy. (Ger). Wiss. Z. Martin-Luther-Univ. Halle-Wittenberg, Math.-Naturwiss. Reihe 10(5): 1153-1154. MAM: W1 HA302.

Possible biosynthesis of the alkaloids from phenylalanine.

1207. MOTTE, J. 1948. Dimerous flowers of Papaver setigerum and their diagramatic interpretation in the framework of the Rhoeadales. (Fr). Compt. Rend. Hebd. Seances Acad. Sci. 227: 143-145. 505 P21.

Reduction in petal, stamen and carpel number in spontaneous populations of P. setigerum are cited as evidence of the relationship of the Papaveraceae with the Fumariaceae and Cruciferae.

1208. MOTTET, S. 1893. The annual poppies. (Fr). Rev. Hort. 65: 348-351. 80 R32.

Description of 8 horticultural poppies.

1209. MOWAT, A. B., and S. M. WALTERS. 1964. Papaver L., pp. 247-250. In Tutin, T. G. et al., Flora Europaea, Vol. 1. Cambridge University Press. 459 T88.

Taxonomic treatment of 26 species occurring in Europe. P. somniferum is divided into three subspecies.

1210. MOWSZOWICZ, J. 1966. Effects of climatic factors on sex formation in plants. (Pol; summ. Fr). Ekol. Pol., Ser. B 12(4): 313-318. 512 W263B.

The appearance of unisexual flowers of P. orientale which had 1 normal pistil surrounded by 8 small pistils without stamens, can be explained as an effect of climatic conditions such as excessive rainfall.

1211. MRAZ, F. 1960. Influence of the harmful effect of the fungus Helminthosporium papaveris on poppy yields in the region Karlovy Vary in the years 1957 and 1958. Sborn. Ceskoslav. Akad. Zemed. Ved. Rostl. Vyroba 6(8): 1083-1094. 64.9 C33.

High temperature and rainfall in July favors the fungus and lowers the seed yield. A seed drench of Agronal is recommended.

1212. MRAZ, F. 1963. A study of the influence of disinfectants on the conidia of Helminthosporium papaveris Hennig. (Czech; summ. Rus and Ger). Rostl. Vyroba 9: 51-64. 64.9 C33.

Agronal applied to dry poppy seed was more effective against H. papaveris than 6 other fungicides.

1213. MRAZ, F. 1964. A method for determining the share of the "health effect of heterosis" in "yield effect." (Czech; summ. Rus and Ger). Rostl. Vyroba 10: 909-912. 64.9 C33.

The method described allows one to determine the proportion attributable to an improvement in the state of health of a hybrid as a result of heterosis.

1214. MRAZ, F. 1965. Treatment of the Papaver seeds pays off. (Czech). Za Vysokou Urodu 13(2): 58-59. 64.8 Z12.

Treatment of the seed with Agronal controls Helminthosporium papaveris.

1215. *MRAZ, F., and V. MARTINEK. 1956. The effect of heterosis upon the infestation of poppyheads with the fungus Helminthosporium papaveris Hennig. I. The health effect of heterosis. (Czech; summ. Eng and Rus). Sborn. Ustav. Vedeckotech. Inform., Genet. Slechteni 1(4): 25-36.

1216. MÜHLE, E. 1947. Diseases and injuries on the poppy (Papaver somniferum L.) and the organisms which cause them. (Ger). Pharmazie 2(7): 334-335. LC: RS1 P673.

Mites, insects and fungi which attack poppies.

1217. MÜLLER, A. 1914. The importance of alkaloids of Papaver somniferum for the life of the plant. (Ger). Arch. Pharm. 252: 280-293. 396.8 Ar2A.

1218. MÜLLER, A. S. and C. CHUPP. 1936. A second contribution to the Cercosporae of Minas Geraes. (Port; summ. Eng). Arq. Inst. Biol. Veg. 3: 91-98. 451 R472.

Cercospora papaveri sp. nov. on Papaver.

1219. MÜLLER, B. 1918. Culture of poppies. (Ger). Biedermann's Zentralbl. Agrikulturchem. 47: 254-256. 384 B47.

Review of Ranninger, R., Nachr. Deitsch. Landw. Ges. Osterreich 1917(10): 89. Tests of plant spacing showed that rows 30 cm wide and plants 20 cm apart resulted in the highest yields.

1220. MÜLLER, K. R. 1943. Observed poppy injuries from plant enemies. (Ger). Landesbauernschaft Sachsen-Anhalt Wchnbl. 101: 209. 18 Sa9.

Injuries caused by Dendryphium penicillatum, Helminthosporium papaveris and Entyloma fuscum with their control.

1221. MUNZ, P. 1959. A California flora. Univ. California Press, Berkeley. 1681 pp. SI: QK149 M97.

Papaveraceae (pp. 192-201) include P. somniferum, P. rhoeas, P. californicum, P. argemone and P. apulum.

1222. MURBECK, S. 1912. Investigation of the floral morphology of Papaveraceae. (Ger). Kongl. Svenska Vetenskapsakad. Handl. 50(1): 1-168. 502 St6H.

Detailed discussion of the structure of the stamens and pistils are given for Papaver on pp. 22-40, with many floral diagrams for P. somniferum.

1223. MUSCHLER, R. 1912. A manual flora of Egypt. Vol. I. R. Friedlaender & Son, Berlin. 672 pp. SI: QK403 M98.

There are 7 species of Papaver including P. somniferum in the Papaveraceae on pp. 375-384.

1224. NAGORNYI, P. I. 1913. Fungus parasites collected in the government of Stavropol, USSR, during the summer of 1911 and 1912. (Rus). Zhurn. "Bolezni Rast." 7: 87-125. 464.8 Z6.

Peronospora arborescens on Papaver spp. (pp. 94, 97).

1225. *NAJCEVSKA-POPOVSKA, C. M. 1965. The most important biological and production properties of opium poppy populations in Macedonia. (Macedonian; summ. Rus). Annu. Fac. Agric. Sylvic. Univ. Skopje, Agric. 1964-1965 18: 217-290.

P. somniferum subsp. anatolicum cultivated in Macedonia, and white-seeded varieties gave highest opium yields, morphine content, seed and oil.

1226. NAKAGAWA, Y., and H. ISAKA. 1958. Qualitative and quantitative tests of alkaloids with sodium tetraphenyl-boron. (Jap; summ. Eng). Bull. Nat. Inst. Hyg. Sci. (Tokyo) 76: 69-73. LC: 499.074 K33S.

Semi-micro amounts (ca. 20 mg) of alkaloids, including morphine, narcotine, papaverine and codeine can be determined gravimetrically.

1227. NAKAGAWA, Y., H. ISAKA, and N. MIYASHITA. 1959. Morphine content of Japanese opiums collected during 1957-1958. (Jap; summ. Eng). Bull. Nat. Inst. Hyg. Sci. (Tokyo) 77: 479-480. LC: 499.074 K33S.

Opium of the majority of cultivars contained 10-14% morphine.

1228. NAKAGAWA, Y., H. ISAKA, and Y. MIYAZAWA. 1961. Morphine content of Japanese opium collected during 1959-1960. (Jap; summ. Eng). Bull. Nat. Inst. Hyg. Sci. (Tokyo) 79: 259-260. LC: 499.074 K33S.

The opium of 62% of the samples contained 13-14% morphine.

1229. NAKAGAWA, Y., H. ISAKA, and S. YOSHIKAWA. 1958. Morphine content of Japanese opium produced during 1956-1957. (Jap; summ. Eng). Bull. Nat. Inst. Hyg. Sci. (Tokyo) 76: 303-306. LC: 499.074 K33S.

The opium of a majority of cultivars contained 10-14% morphine.

1230. NAKAMURA, G. R. 1960. Some applications of paper chromatography in the detection of opium alkaloids. Bull. Narc. 12(4): 17-20. LC: HV5800 B8.

Used in determining opium alkaloids in mixtures of other substances.

1231. *NAMBA, T. 1965. Pharmacognostical studies on the crude drug 'Ozokkoku'. Syoyakugaku Zasshi 19(2): 59-68.

'Ozokkoku' is the dried capsules of opium poppies, used in Europe for coughs; for coeliac hypertension by ancient Greeks; in China used as antidiarrhetic and antitussive in Pei-Sung and Chin Dynasties. Comparative anatomy of capsules of _P_. _somniferum_, _P_. _setigerum_, _P_. _orientale_ and _P_. _rhoeas_ given.

1232. NANDA, K. K. 1961. Some observations on the emergence, growth and flowering of branches in _Papaver_ _rhoeas_ L. Phyton (Buenos Aires) 16(1): 27-43. 450 P567.

The main shoot elongates rapidly and terminates in a solitary flower bud after which the buds in the leaf axils emerge in a basipetal manner. This basipetal sequence occurs even on secondary and tertiary branches.

1233. NAUMAN-MERCK, L. 1915. Plant parasites of crops in Argentina and in the neighboring regions. (Fr). Anales Mus. Nac. Hist. Nat. Buenos Aires 26: 163-225. 516 B86A.

Powdery mildew, _Erysiphe_ _polygoni_ on _P_. _somniferum_ in Argentina.

1234. NAUMANN, K. 1958. On the reaction of different morphological strains of _Helminthosporium_ _papaveris_ to actinomycete strains of differing activity. (Ger). Arch. Mikrobiol. 28: 417-442. 442.8 Ar26.

Dimensions of the inhibition zones were studied.

1235. NAUMOV (NAOUMOFF), N. 1914. Materials for the mycological flora of Russia. Fungi ussuriensis I. (Fr). Bull. Soc. Mycol. France 30: 62-83. 451 P213.

Peronospora _arborescens_ on _Papaver_ _somniferum_ in USSR.

1236. NAUMOV, N. A. 1954. The fungus flora of the Leningrad region. (Rus). Vol. 1. Moscow. 258 pp. 462.16 N22.

Peronospora _arborescens_ on _Papaver_ _somniferum_.

1237. NAUMOVA, G. E., and V. V. SHEVERSTOV. 1971. Some characteristics of nutrient metabolism in oil poppy leaves in relation to different nutrient conditions. (Rus). Agrokhimiya 5: 92-95. 385 Ag89.

In pot trials, a ratio of 2:2:1 of N, P and K (0.8g/pot/unit) gave the highest yields of seeds and capsules and the highest alkaloid content.

1238. NAVARA, J. 1964. The effect of fluorine on germination of seeds, with regard to the natural content of ash compounds and some mineral elements. (Czech; summ. Rus and Ger). Biologia (Bratislava) 19(8): 589-596. 442.8 B5265.

Fluorine has little effect on poppy seed germination.

1239. NAVARA, J. and Z. HOLUB. 1968. Effect of fluorine-containing industrial effluents on plants. (Czech; summ. Rus and Ger). Biol. Prace Slov. Akad. Vied. 14(1): 1-92. 442.9 S152.

Germination of poppy seed was resistent to NaF.

1240. NAVARA, J., and Z. HOLUB. 1968. Effect of fluoride upon plants. Fluoride Quart. Rep. 1: 38-40. MAM: W1 FL957.

The germination of poppy seeds was not affected by the presence of 300-6000 ppm NaF.

1241. NAVARRO DE PALENCIA, J. 1954. The attacks of Fusarium on the opium poppy. (Span). Bol. Inst. Nac. Invest. Agron. 14: 377-381. 105.6 Sp14.

In Spain, Fusarium martii or F. (oxysorum var.) cubense attacks poppy plants late in the growth cycle causing foliar wilt followed by death of the plant. Control is only preventive.

1242. NEERGAARD, P. 1937. Ann. Rep. Phytopathol. Lab. J. E. Ohlsens Enke, Seed Growers, Copenhagen 11 April 1936-31 March 1937, No. 2: 3-11. (Dan; summ. Eng). 464.9 Oh4.

Helminthosporium papaveris causes damping off in P. somniferum in Denmark.

1243. NEERGAARD, P. 1937. Annual report of the phytopathological laboratory of J. E. Ohlsen's widow from April 1, 1936 to March 31, 1937. (Dan; summ. Eng). Ohlsens Enke Plantepatol. Lab., Aarsber. 2: 1-11. 464.9 Oh4.

Severe infection by Helminthosporium papaveris was observed on seeds and seedlings of Papaver somniferum, P. paeoniflorum, P. mursellii and P. rhoeas in Denmark.

1244. NEERGAARD, P. 1951. 15th and last annual report from the Phytopathological Laboratory of J. E. Ohlsens Enke, seed growers, Copenhagen. (Dan; summ. Eng and Esper). Ohlsens Enke Plantepatol. Lab., Aarsber. 15: 1-33. 464.9 Oh4.

Pleospora calvescens on Papaver somniferum in Denmark.

1245. NEERGAARD, P. 1957. Annual report for June 1, 1955 to May 31, 1956 from the Plant Protection Service of Denmark on seed pathological testing. (Dan; summ. Eng). (Denmark) Statens Plantetilsyn, Aarsber. Fropatol. Kontrol 8: 1-15. 464.9 D41.

Pleospora calvescens seedborne on Papaver somniferum and P. rhoeas.

1246. NEGODI, G. 1932. Aspects of parthenocarpy in species of the genus Papaver. (Ital). Ann. Bot. (Rome) 19(3): 497-509. 450 An71.

Studies of P. bracteatum, P. somniferum and P. rhoeas.

1247. NEGODI, G. 1932. Behavior of petal color in intraspecific crosses of P. rhoeas and its interpretation. Ann. Bot. (Rome) 19(3): 510-527. 450 An71.

In crosses between red and white flowered forms, the F_1 had red petals with a white edge which was not due to the presence of a progressive factor for white edge but to the presence of only 1 color factor for intense red.

1248. NEGODI, G. 1936. Metamorphic floral characters in some groups of species of Papaveraceae. (Ital). Riv. Biol. 20: 201-213. 442.8 R52.

Pigmentation of flowers, particularily epidermal tissue, was studied in various Papaveraceae, including P. rhoeas, P. orientale, P. bracteatum, P. somniferum and P. hybridum.

1249. NEGODI, G. 1937. Further contributions to the cytology of the Papaveraceae. (Ital). Arch. Bot. (Forli) Ser 3, 13: 71-81. 450 Ar24.

Chromosome numbers for several genera including Papaver.

1250. NEHRING, K. 1948. Sowing time and N-manuring experiments with poppy. (Ger). Z. Pflanzenernahr. Dungung Bodenk. 42(1): 31-39. 384 Z343A.

Early sowing results in earlier harvest and higher seed yield.

1251. NEHRING, K., P. RZYMKOWSKI, and J. SCHÜTTE. 1945. On the influence of nitrogenous fertilizers, especially late addition, on the yield and composition of oil. (Ger). Bodenk. & Pflanzenernahr 35: 247-270. 384 Z343A.

In pot trials, poppy utilized late addition of N to increase seed rather than straw yield, but in the field the effects were small and dependent on weather.

1252. *NEMEC, P., P. KOVACS, M. PSENAK, and A. JINDRA. 1972. Enzymes in amino acid metabolism. VIII. Phenylalanine ammonia-lyase in poppy plants - *Papaver somniferum*. Biochem. Physiol. Pflanz. 163(4): 411-415.

1253. NEMECKOVA, A., A. D. CROSS, and F. SANTAVY. 1967. Occurrence of isorhoeagenine glycoside. (Ger). Naturwissenschaften 54(2): 45. 474 N213.

The alkaloid isolated from *P. rhoeas* is characterized.

1254. NEMECKOVA, A., V. PREININGER, and F. SANTAVY. 1966. Isolation and identification of alkaloids from *Papaver orientale* L., *Papaver rhoeas* L. and other *Papaver* species. (Ger). Abh. Deut. Akad. Wiss. Berlin, Kl. Chem. 1966(3): 319-323. 509 D482.

A review of 5 years of chromatographic investigations of the species.

1255. NEMECKOVA, A., and F. SANTAVY. 1962. Isolation of alkaloids from *Papaver rhoeas* L. and *P. dubium* L. (Ger; summ. Rus). Coll. Czech. Chem. Commun. 27: 1210-1223. 385 C68.

1256. NEMECKOVA, A., F. SANTAVY, and D. WALTEROVA. 1970. Alkaloids of Papaveraceae. LII. Alkaloids from some plant species of the section *Orthorhoeades*. Coll. Czech. Chem. Commun. 35(6): 1733-1744. 385 C68.

Isolated from *P. rhoeas*, *P. dubium*, *P. commutatum* and *P. californicum*.

1257. NESMITH, E. N. 1945. Oriental poppies in 1945. Horticulture 23: 338. 80 H787.

Outstanding varieties and their cultivation.

1258. NESTERENKO, V. G. 1960. Germination of seeds stored under laboratory conditions. (Rus). Bjull. Glavn. Bot. Sada 36: 99-103. 451 M854.

Seeds were stored in closed metal boxes at a temperature of 20°-29°C in summer and 13°-23°C in winter. After 5 years *P. dubium* had 75% germination, *P. nudicaule* 100%; after 6 years *P. somniferum* 74%.

1259. NESTEROV, N. N., O. V. BAGINSKII, and V. V. SHEBERSTOV. 1972. Economic effectiveness of applying mineral and organic fertilizers to *Papaver somniferum* in Khmel'nitsk region of the Ukraine. (Rus). Khim Sel'skom Khoz 10(1): 56-59. 385 K524.

Yield of morphine increased considerably with a full mineral fertilizer. A second application of fertilizer is not economical.

1260. NEUBAUER, D. 1964. Appearance of the most important alkaloids of the opium poppy in the individual organs and at various developmental stages. (Ger; summ. Eng). Pl. Med. 12(1): 43-50. 450 P697.

Distribution of morphine, codeine, thebaine and narcotoline was determined during development of 3 strains of *P. somniferum*.

1261. NEUBAUER, D. 1965. Biosynthesis of thebaine from tyrosine in *Papaver bracteatum*. (Ger). Arch. Pharm. 298(11): 737-741. 396.8 Ar2A.

New Leaves of 3 year old plants were fed labeled tyrosine and the thebaine isolated and degraded. The higher radioactivity of the aldehyde half of the thebaine indicated that it was formed more rapidly than the amine half.

1262. NEUBAUER, D. 1966. Biosynthesis of thebaine from tyrosin in *Papaver bracteatum*. (Ger). Abh. Deut. Akad. Wiss. Berlin, Kl. Chem. 3: 341-343. 509 D482.

Leaves were fed labeled tyrosin which was incorporated into thebaine.

1263. NEUBAUER, D., and K. MOTHES. 1961. Thin layer chromatography of poppy alkaloids. (Ger; summ. Eng). Pl. Med. 9(4): 466-470. 450 P697.

A simple method for the estimation of the main alkaloids of opium is described. Analysis of individual plants of *P. orientale* found some that were thebaine-rich.

1264. NEUBAUER, D., and K. MOTHES. 1963. *Papaver bracteatum*. I. A new method for obtaining morphine from a plant raw material. (Ger; summ. Eng). Pl. Med. 11: 387-391. 450 P697.

Thebaine comprises 98% of the total alkaloid of *P. bracteatum*. Disbudding the plants increases the weight and alkaloid of the root where the highest amount is found.

1265. NEUFELD, O. E., and E. I. ROSENBLUM. 1949. The estimation of morphine in opium poppy. J. & Proc., Roy. Austral. Chem. Inst. 16: 252-254. 385 Au72.

A reliable, rapid method for the determination of morphine in poppy capsules and straw.

1266. NEW SOUTH WALES, DEPT. OF AGRICULTURE. BIOLOGICAL BRANCH. 1938. Plant diseases. Agric. Gaz. New South Wales 49(6): 320-324. 23 N472.

Symptoms and control of spotted wilt (virus) of Iceland poppies.

1267. NEWTON, W. C. F. 1929. The inheritance of flower colour in *Papaver rhoeas* and related forms. J. Genet. 21(3): 389-404. 442.8 J823.

Extensive study of the factors and linkage in the flower color with a comparison with *P. somniferum*.

1268. NIERMANN, M., and M. WINTER. 1931. Metabolic studies on sound infants fed vegetable milk. (Ger). Arch. Kinderheilk. 94(2/3): 146-159. MAM.

Poppy milk is unsuitable for infant diet in the first months of life.

1269. NIETHAMMER, A. 1928. Problems of stimulation in connection with internal factors which cause germination. (Ger). Beitr. Biol. Pflanzen 16: 267-350. 450 C66.

Representative species from a number of families are grouped into categories dependent on germination requirements of their seeds. *P. rhoeas* seeds require light for germination immediately after harvest but after 3 months the need for light decreases.

1270. NIETHAMMER, A. 1928. Continuing investigation on the chemistry of the seeds of angiosperms and the external natural as well as artificial germination factors. I. The influence of frost on the germination capability. (Ger). Biochem. Z. 197: 241-244. 384 B522.

Seeds of *Chelidonium majus* and *Papaver rhoeas* were treated with various combinations of light and temperature to study effects on germination. For *C. majus* darkness followed by freezing or light treatment alone were favorable. For *P. rhoeas* both darkness and light with freezing were unfavorable, whereas dark or light treatment alone were alike in their effects.

1271. NIKONOV, G. K. 1958. Accumulation and distribution of the main alkaloids in the opium poppy in the course of its ontogenesis. Bull. Narc. 10(1): 20-24. LC: HV5800 B8.

Accumulation of alkaloids depends on the rate of accumulation of dry substances in the plant and is most rapid from flowering to maturity. Morphine and narcotine accumulate when the plant is young; codeine and papaverine as it ages. The capsule contains 70% of the main alkaloids of the plant at maturity.

1272. NILOW, W. I., W. P. NILOWA, and A. T. TROSTSCHENKO. 1936. Fermentative oxidation of morphine in the latex of the opium poppy. (Rus; summ. Ger). Bioklimiya 1: 165-182. 385 B523.

Oxidation can occur *in vitro* with the addition of peroxide.

1273. NOLTE, H.-W. 1951. Capsule yellowing of poppy. A gall wasp as a new German poppy pest. (Ger). Z. Pflanzenkrankh. Pflanzenschutz 58: 89-92. 464.8 Z33.

Larvae of a gall wasp tunnel the stems of the opium poppy in Germany resulting in premature ripening and yellowing of the capsules.

1274. NOLTE, H.-W. 1951. Krankheiten und Schädlinge der Ölfruchte. (Diseases and pests of oil-crops). Neumann Verlag, Radebeul and Berlin. 64 pp.

Peronospora arborescens and *Helminthosporium papaveris* in Germany on oil poppy.

1275. NOLTE, H.-W. 1952. Old and new poppy parasites. (Ger). Deutsche Landw. 3: 379-382. 18 D4822.

Helminthosporium papaveris and *Peronospora arborescens* are associated with the damage of poppy capsule curculio, *Ceuthorrhynchus macula-alba*. The fungi enter the capsule where the larvae have damaged it.

1276. NOLTE, H.-W. 1952. The economic importance of destructive insect pests of poppy. (Ger). Deut. Akad. Landwirtwiss. Biol. Zentranst. Pflanzenschutztagung, 1952: 26-29. 464.9 P483.

Damage done to poppy by *Ceutorrhynchus macula-alba*, *Stenocarus fuliginosus* and *Timaspis papaveris*.

1277. NOLTE, H.-W. 1954. *Carpodiplosis papaveris* Kjell., a new poppy gall midge for Germany. (Ger). Zool. Anz. 152: 240-241. 410 Z7.

On *P. somniferum*.

1278. NORDAL, A. 1956. Natural and synthetic drugs with morphine-like effects considered from a pharmacognostic point of view. Bull. Narc. 8(1): 18-27. LC: HV5800 B8.

The opium poppy can be successfully grown in large areas of the world and the drugs can be produced in countries with under-developed chemical industries. Synthetic substitutes require highly developed laboratories but have the advantage of unlimited variations of the basic molecule.

1279. NORDAL, A., and M. B. FALCK. 1964. Opium with 25 per cent morphine content produced in Norway. Norges Apotekerforen. Tidskr. 9: 1-4. John Crerar Libr.

The samples of opium produced in south eastern Norway contained 23.2% and 27% morphine, calculated on the basis of anhydrous opium.

1280. NORDESTGARD, A. 1960. Experiments on varieties of opium poppy (Papaver somniferum) 1948-1958. (Dan; summ. Eng). Tidsskr. Planteavl 63(5): 848-855. 11 T439.

The yields of seed, crude fat and crude oil in Svalof Flora and Aarslev Luna were superior to the German variety Mahndorfer.

1281. NORDESTGARD, A. 1966. Experiments on strains of opium poppies 1960-1964. (Dan; summ. Eng). Tidsskr. Planteavl 70(1): 13-16. 11 T439.

Svalof Flora II gave 4% greater yield of seed and 2% more fat than Aarslev Luna and 13% more than Maribo 20/60. Maribo had the greatest morphine content and ripened later than the others.

1282. NORDESTGARD, A. 1966. Experiments with hoeing of opium poppy 1961-1964. (Dan; summ. Eng). Tidsskr. Planteavl 70(3): 337-339. 11 T439.

Earthing-up with ridges 5-10 cm high reduced the tendency of the straw to break, and in strains with weak straw increased seed yield by 70 kg/ha. There was no increase where there was no tendency of straw breakage.

1283. NORDHAGEN, R. 1931. Studies on the Scandinavian races of *Papaver radicatum* Rottb. as well as several new kinds confused with them. (Ger). Bergens Mus. Arbok, Naurvid. Rekke 2: 1-50. 502 B45.

Four new subspecies of *P. radicatum* and 3 new species, *P. relictum*, *P. lapponicum* and *P. dahlianum*, are described using characters of the latex, petals, stigmatic disc, capsule and leaf forms.

1284. NORRIS, T. 1941. Torus anatomy and nectary characteristics as phylogenetic criteria in the Rhoeadales. Amer. J. Bot. 28: 101-113. 450 Am36.

The Papaveraceae cannot be considered the most primitive family of the Rhoeadales because of the absence of nectaries and nectariferous tissue. It appears that the Papaveraceae, Fumariaceae and the Cruciferae were derived by parallel evolution from a common ancestral group.

1285. NOSYREV, V., A. JAKUNINA, and B. ZJUBIN. 1965. Poppy pests. (Rus). Zasc. Rast. Vredit. Boleznej 10(8): 54-55. 421 Z1.

Poppy root snout beetle (*Stenocarus fuliginosus*) can be controlled at germination and the rosette stage with BHC or DDT. *Pratylenchus protensis* and *Peronospora arborescens* are also reported on poppy roots.

1286. NOVAKOVA, V. 1961. Damage done by herbicide aerosols. (Pol). Socialist. Zemedelstvi 8: 713-719. 19.5 Z1.

Damage by oily aerosol herbicides containing 7.5 and 10% 2,4-D butylester at 5.5 kg/ha on plants, including poppies.

1287. NYARADY, A. 1942. The Hungarian poppy species. (Hung; summ. Ger). Acta Geobot. Hung. 5(1): 3-68. 450 Ac86.

A systematic treatment of 3 sections, including descriptions of the species, ecological data and occurrence of natural hybrids.

1288. OESCU, C. V., and I. N. RADULESCU. 1933. Peronosporaceae collected in the valley of the Jijia river. II. (Fr). Ann. Sci. Univ. Jassy 18: 423-442. 475 J31.

Peronospora arborescens on *Papaver somniferum* in Rumania.

1289. OHASHI, H. 1962. The geographical variability of chemical substances in plants in relation to vernalization. (Rus). Agrobiologija 2: 268-272. 20 Ag822.

Vernalization of *P. somniferum* at relatively high temperatures results in increased contents of oil, alkaloid and fat.

1290. OHASHI, H., A. TAGAWA, and S.-M. CHIANG. 1964. A study of vernalization of opium poppy. 2. Effects of temperature of treatment and water content of seeds on the development and yields of opium and its composition. (Jap; summ. Eng). Bot. Mag. (Tokyo) 77: 300-307. 450 B651.

Seeds held at 6°C for 20 days at 30-50% water content showed early development of the plant and increased opium yield.

1291. OHWI, J. 1965. Flora of Japan. (English). Ed. by F. G. Meyer and E. H. Walker. Smithsonian Institution, Washington, D.C. 1066 pp. SI: QK369 038.

Papaveraceae are given on pp. 474-479 and include *P. fauriei*, *P. orientale*, *P. rhoeas*, *P. somniferum* and *P. bracteatum*.

1292. OKUDA, S., K. ABE, S. YAMAGUCHI, and T. IBUKA. 1968. Studies on morphine alkaloids. III. Indolinocodeine. II. 9-alpha-methoxyinodolinocodeine. Chem. Pharm. Bull. 16(2): 370-373. RM1 C5.

1293. OKUNO, I., T. NAMBA, and S. TAKAHASHI. 1966. Pharmacognostical studies on the crude drug "Ozokkaku" (Supplement). (Jap; summ. Eng). Shoyakugaku Zasshi 20(1): 25-31. Linda Hall Libr., Kansas City, Mo.

Histological features of the peduncles and receptacles can be used in differentiating *P. somniferum*, *P. setigerum*, *P. orientale* and *P. rhoeas*.

1294. OPAZO, R. 1920. Cultivation of oil plants. (Span). El Agricultor (Chile) 5: 195-198. 9.3 Sol2.

Cultural directions are given for a number of plants including poppy.

1295. OPITZ, K. 1939. Flax and carrots grown together. (Ger). Forschungsdienst 8: 57-62. 241 D48F.

Growing carrots with poppy cannot be recommended since their weather requirements are different.

1296. ORAM, J. B. 1950. Colorimetric determination of morphine. Amer. J. Pharm. 122: 60-66. 396.8 Am3.

Morphine produces a pink to red colored solution in the presence of ammonium hydroxide, copper sulfate and hydrogen peroxide.

1297. ORGELL, W. H. 1963. Inhibition of human plasma cholinesterase *in vitro* by plant extracts. Lloydia 26(2): 59-66. 442.8 L77.

Aqueous extracts of *P. orientale* gave some *in vitro* inhibition of human plasma cholinesterase.

1298. OTTESTAD, E., E. BROCHMANN-HANSSEN, D. ÖISETH, and A. NORDAL. 1959. The water-soluble carbohydrates of *Papaver somniferum* L. J. Pharm. Pharmacol. 11: 689-693. MAM.

An aqueous extract of opium poppy capsules of Yugoslavian origin yielded glucose, fructose, sucrose, sedoheptulose, mannoheptulose and a complex polysaccharide.

1299. OUDEMANS, C. A. J. A. 1905. Catalogue of fungi of the Netherlands. (Fr). Verh. Kon. Nied. Akad. Wetensch., Afd. Natuurk., Tweede Sect. 11: 1-599. 503 An8V.

On page 382, downy mildew, *Peronospora arborescens*, is parasitic on *P. somniferum*.

1300. OVERSACQ, J. 1951. Plants which heal: the field poppy. (Fr). Cour. Hort. 13: 362. 80 C834.

Historical investigation of *P. rhoeas* as a possible substitute for the opium poppy.

1301. PAAL, H., and P. GRACZA. 1969. Contributions to the seed development of field poppy (*Papaver rhoeas* L.). Acta Agron. Acad. Sci. Hung. 18: 387-390. 19 Ac8.

A histological study.

1302. PALIWAL, Y. C., and T. K. NARIANI. 1965. Effect of plant extracts on the infectivity of sunhemp (*Crotalaria juncea* L.) mosaic virus. Acta Virol. 9: 261-267. 448.3 Ac85.

Leaf extracts of *P. somniferum* moderately inhibited the virus.

1303. PALTI, J., and M. CHORIN. 1964. Peronosporaceae in Israel. Phytopath. Medit. 3: 50-56. 464.8 P565.

Peronospora arborescens was collected on *Papaver somniferum* in March in the Negev, from March to June on the Coastal Plain and in May in the Hula Valley.

1304. PALUCH, J., and A. NOGAJ. 1966. Plant tests as indicators of toxicity of waters polluted with detergents. Zesz. Nauk. Politech. Slask. Chem. 34: 155. Army Document Libr.

Germination and growth of rootlets and seeds of a number of plants including poppy were inhibited by sodium alkyl aryl sulfonates, Alphenol, Sulfsipol and their mixtures.

1305. PAPADAKIS, J. 1951. Posibilidades agricolas de la remolacha azucarera, amapola y guayule en la Republica Argentina. (Agricultural potential of the sugar beet, poppy and guayule in Argentina). Argentine Republ., Minist. Agric. Ganaderia, Buenos Aires. 27 pp. 64 Ar3.

During 1947-1948 poppy cultivation was encouraged and on the basis of this crop, the ecological requirements, areas suitable for production, the best methods of cultivation and the problems are here reported.

1306. PAPADAKIS, J. 1970. Agricultural Potentialities of World Climates. 70 pp. Printed by the author, Buenos Aires.

Climatic requirements of poppy grown for oil are similar to those for rape, which is grown in marine, cold continental, monsoon subtropical and cool winter tropical climates; for opium, it requires a dry climate like those preferred by gram, extensively grown in Mediterranean climates. With irrigation poppy can be grown in hot subtropical deserts.

1307. PAPE, H. 1933. False mildew of poppy. (Ger). Gartenwelt 37: 289-290. 80 G196.

Peronospora arborescens on opium and oil poppy in Yugoslavia. Control methods are given.

1308. PAPE, H. 1944. The most important diseases and pests of oil poppy and their control. (Ger). Mitt. Deutsche Landw. 59: 734-736. 18 D48M.

Discusses *Peronospora arborescens*, *Helminthosporium papaveri*, *Pleospora calvescens*, *Coeliodes fuliginosus*, *Ceutorrhynchus macula-alba* and *Dasyneura papaveris*.

1309. PAPP, I., and L. JOZSA. 1965. Volume of planted stock and yield of poppy. (Hung). Magyar Mezogazd. 20(8): 6. 19 M27.

1310. PAPP, I., and L. JOZSA. 1966. The influence of plant spacing and arrangement on poppy yields. (Hung; summ. Rus and Ger). Debreceni Agrartud. Foisk. Tud. Kozlem. 1965(11): 75-83. 105.9 D35.

The optimum space required is 320-330 cm^2/plant corresponding to 303-312.5 thousand plants/ha.

1311. PAPP, I., and L. JOZSA. 1966. Plant density effect on yield volume of poppy. (Hung). Magyar Mezogazd. 21(14): 6. 19 M27.

1312. PAPP, I., and L. JOZSA. 1967. The effect of stand density on yield volume of poppy. (Hung). Mezogazd. Eelelmez. Minszterium 1967, Evi Fobb Kut. Eredmenyei 1967: 91-95. 19 H8942.

1313. PARAMONOV, S. 1953. The principal pests of oil-seed plants in the Ukraine. (Ger). Z. Angew. Ent. 35(1): 63-81. 421 Z36.

Main pests of oil poppy (*P. somniferum*) in Ukraine is *Ceutorrhynchus macula-alba* Herbst (p. 67).

1314. PARIS, R. 1963. Tranquilizing action of some medicinal plants. (Fr). Ann. Pharm. Franc. 21(3): 266. 396.8 An7.

Extracts of plants including wild poppy tranquilized mice when injected subcutaneously.

1315. PARIS, R., and G. FAUGERAS. 1966. Thin-layer chromatographic determination of morphine in the capsules of common poppies. (Fr). Ann. Pharm. Franc. 24(9-10): 613-616. 396.8 An7.

An outline of the method.

1316. PARIS, R., G. FAUGERAS, L. BALARD, and M. CAPMAL. 1961. Estimation of morphine in *Papaver* capsules by paper chromatography and paper electrophoresis. (Fr). Ann. Pharm. Franc. 19(7-8): 494-500. 396.8 An7.

P. somniferum var. *nigrum* capsules were used.

1317. PARIS, R., G. FAUGERAS, L. BALARD, and M. CAPMAL. 1966. Application of the Mannich method, modified by Fischer, for the gravimetric determination of morphine in selected poppies collected in 1964 and 1965. (Fr). Ann. Pharm. Franc. 24(6): 411-417. 396.8 An7.

The method was accurate for poppy capsules containing more than 1% morphine, but it was not suited for the other parts of the plant with low morphine content.

1318. PARISI, R. 1921. Notes of some parasites of medicinal and aromatic plants. (Ital). Bull. Orto Bot. Regia Univ. Napoli 6: 285-296. 451 N16.

Macrosporium papaveris is described as a new species on *P. somniferum* in Italy.

1319. PARISI, R. 1921. Some parasites of medicinal and essence-producing plants. (Ital). Rivista Patol. Veg. 11(1/2): 1-16. 464.8 R52.

Macrosporium papaveris on the capsules of *P. somniferum*.

1320. PARISI, R. 1924. Contribution to the mycology of southern Italy. (Ital). Bull. Orto Bot. Regia Univ. Napoli 7: 35-66. 451 N16.

The name of *Macrosporium papaveris* was changed to *M. bresadolae*.

1321. PARODI, L. R. 1964. Enciclopedia Argentina de Agricultura y Jardineria. Vol. II, 2nd Part. 1408 pp. & index (Span). Chapter 25, Medicinal Poppy (by A. Cesar Copello). pp. 989-1008. Editorial Acme, S.A.C.I., Buenos Aires.

Good summary of agronomic statistics, use, and diseases in Argentina.

1322. PARSA, A. 1951. *Papaver*, pp. 462-498. *In* Flore de l'Iran. Vol. 1(1). Teheran. SI: 581.955 P26.

P. somniferum var. *leptocaulotum*, var. *album* and var. *collinum* are among the *Papaver* listed.

1323. PATCH, E. M. 1938. Food-plant catalogue of the aphids of the world including the Phylloxeridae. Maine Agr. Expt. Sta., Orono, Bull. 393: 125-126 (*Papaver*). 100 M28S.

The following aphids are listed as pests on *P. somniferum*: *Aphis gossypii* Glover, *A. rumicis* L., *Myzus persicae* Sulzer, *Rhopalosiphum papaveris* Takahashi, *Yamataphis papaveris* Takahashi.

1324. PATEL, M. K., M. N. KAMAT, and V. P. BHIDE. 1949. Fungi of Bombay, supplement I. Indian Phytopath. 2: 142-155. 464.8 In2.

Erysiphe cichoracearum and *Sclerotium rolfsii* on *P. somniferum*.

1325. PAVGI, M. S., and U. P. UPADHYAY. 1964. Parasitic fungi from North India. II. Mycopath. Mycol. Appl. 24: 347-354. 450 M994.

Cercospora papaveri occurs commonly on *P. somniferum*.

1326. PAVLOV, I. F. 1949. Poppy root snoutbeetle (*Stenocarus fuliginosus* March.). (Rus). Zool. Zhurn. 28: 243-252. 410 R92.

On *P. somniferum* in USSR.

1327. PAYER, J. 1857. Traite d'organogenie comparee de la fleur. 2 vols. Masson, Paris. Text 749 pp. Plates 154 pp. 463.4 P29.

The developmental stages of the flower of the Papaveraceae are discussed on pp. 217-226, with excellent illustrations, plates 45-48.

1328. PEATTIE, D. C. 1926. The poppy - blessing and curse. pp. 193-214. *In* D. C. Peattie, Cargoes and harvests. D. Appleton & Co., New York.

History of opium use and trade, particularly between England, China and India.

1329. PEK, L. V. 1957. Contribution to the insect pests of opium poppy in Kirgizia. (Rus). Akad. Nauk Kirgizskoi SSR, Inst. Zool. Parazitol., Trudy 1957(6): 173-188. 410.9 Ak17.

Description of a large number of insect pests and their damage to poppy.

1330. PEK, L. V. 1962. Biocenotic complexes of insects associated with the opium poppy in the basin of Lake Issyk-kul' in Kirgiziya. (Rus). Voprosy ekologii (Problems of ecology). Vysshaya shkola: Moscow 7: 149-150. LC: QH 540.

Depending upon the characteristics of their associations, insects on plantations of opium poppies are divided into polyphages, oligophages (46 spp.), pollinators (about 46 spp.), predators (9 spp.) and parasites (17 spp.).

1331. PEK, L. V. 1962. The history of the study of the entomofauna of the poppy (*Papaver somniferum* L.). (Rus). Sborn. Entomol. Rabot Akad. Nauk Kirgizsk. SSR Kirgizsk. Otd. Vses. Entomol. Obshch. 1: 105-115. 420 V962.

In Kirghizia there are 46 species of poppy pests but only *Acyrthosiphon papaverinum* is a specific pest of poppy.

1332. PEK, L. V. 1962. A table for the identification of insect pests of opium poppy according to their damage. (Rus). Sborn. Entomol. Rabot Akad. Nauk Kirgizsk. SSR Kirgizsk. Otd. Vses. Entomol. Obshch. 1: 116-123. 420 V962.

Damage to leaves, stems and flowers.

1333. PELLEGRINI, G. 1951. Control trials of wheat weeds with selective hormone herbicides. (Ital; summ. Eng). Soc. Gen. Montecatini, Serv. Tec. Agr. Quad. 6: 1-42. 16 M762.

Control of weeds, including *P. rhoeas* in wheat fields with 2,4-D.

1334. PENICAUT, S., B. PENICAUT, and R. BABIN. 1970. Determination of codeine in complex pharmaceutical mixtures. I. Deniges codeine reaction. (Fr). Bull. Soc. Pharm. Bordeaux 109(1): 16-24. MAM.

1335. PENKA, M. 1968. Changes in water economy and morphine content in irrigated and non-irrigated plants of *Papaver somniferum* L. Acta Univ. Agr., Brno, Fac. Agron. 16(4): 579-590. S13 B7.

An irrigated plant used 4.1 liters of water during the growing season while a non-irrigated one used 3.6. Morphine shifted from stem to the poppy head during flower bud formation.

1336. PERCIVAL, M. 1950. Pollen presentation and pollen collection. New Phytol. 49(1): 40-63. 450 N42.

Flowers of *P. orientale* produce 0.114 g of pollen per flower which is 10 loads of pollen for a honey bee. The large amount explains the popularity of this species as a pollen source.

1337. PERRIN, A. 1971. Presence of "transfer cells" in the epithem of some hydathodes. (Fr; summ. Eng). Z. Pflanzenphysiol. 65(1): 39-51. 450 Z32.

"Transfer cells" of _P. rhoeas_ were examined by electron microscopy.

1338. PERSECA, E., L. MLESNITA, and V. MLESNITA. 1960. Some poppy varieties and their behavior against the attack of _Pleospora papaveracea_ (De Not.) Sacc. (Rum; summ. Rus and Eng). Lucr. St. Cluj. Inst. Agron. "Dr. Petru Groza" 16: 201-205. 21 C622.

Varieties Magurele and Cluj are the most resistent to attack by the fungus.

1339. PETERSON, J. L., and S. H. DAVIS, JR. 1970. Anthracnose of poppy caused by _Gloeosporium_. Pl. Dis. Reporter 54(12): 1037-1039. 1.9 P69P.

Flower stem distortion of _P. orientale_ by the fungus is more severe during periods of high humidity.

1340. PETIT, J. 1946. Contribution to the microchemical study of alkaloids of some cultivated poppies. (Fr). Lejeunia 10(5): 25-33. 450 L532.

Microchemical reactions on _P. somniferum_ seeds gave evidence of an alkaloid, probably rhoeadine.

1341. PETIT, P. H. 1827. On the oriental poppy of Tournefort, and the chemical analysis of this plant. (Fr). J. Pharm. Ser. II. 13: 170-184. 383 J825.

Description of the plant and analysis for morphine.

1342. PETRAK, F. 1921. Contributions to the fungus flora of Moravia and Austria-Schlesien. (Ger). Ann. Mycol. 19(5/6): 273-295. 450 An76.

Pleospora pellita and _P. papaveracea_ on _Papaver somniferum_.

1343. PETRAK, F. 1941. Labels for the dried specimens of Cryptogams published by the Vienna Natural History Museum. (Lat). Ann. Naturhist. Mus. Wien 51: 347-373. 410.9 V672.

Entyloma fuscum, leaf smut, on _P. somniferum_ in Hungary.

1344. PETRAK, F., and E. ESFANDIARI. 1941. Contribution to the knowledge of the Iranian fungus flora. (Ger). Ann. Mycol. 39: 204-228. 450 An76.

Peronospora arborescens found on opium poppy in south Iran (p. 204).

1345. PETRI, L. 1942. Review of phytopathological cases observed in 1942. (Ital). Boll. Staz. Patol. Veg. Roma 22: 197-244. 464.9 R662.

Stachylidium sp., Trichothecium sp., Alternaria sp. and Macrosporium sp. were all found on P. somniferum in Italy.

1346. PFÄNDER, H. J. 1967. Detection of the multispecificity of plant antigens by immunization with antigen-antibody-complexes. (Ger; summ. Eng and Rus). Z. Immunitatsforsch Allergie Klin. Immunol. 134(3): 249-266. MAM.

Anti-precipitate-sera produced in rabbits by seed extracts of Papaver setigerum were studied for specificity.

1347. PFEIFER, S. 1956. The paper chromatographic separation of the most important poppy alkaloids. (Ger). Sci. Pharm. 24(1/3): 84-92. MAM.

1348. PFEIFER, S. 1958. The quantitative determination of the most important opium alkaloids on a micro-scale. (Ger). Pharmazie 13(2): 100-109. LC: RS1 P673.

Method is described, together with a short review of the occurrence, biosynthesis and content of alkaloids in the poppy.

1349. PFEIFER, S. 1962. Gravimetric determination of morphine in the form of a morphine-molybdenum-vanadium compound. (Ger). Pharmazie 17: 128-133. LC: RS1 P673.

A criticism of Kopp, E., et al. 1962. Pharmazie 17: 46-48.

1350. PFEIFER. S. 1962. Red-colored alkaloids of the genus Papaver. (Ger). Pharmazie 17: 298-301. LC: RS1 P673.

Five alkaloids (papaverrubines) were identified from 10 species. The spectrum of these red alkaloids varied among the different species and it may be possible to separate species and subspecies on this basis.

1351. PFEIFER, S. 1962. The opium poppy; medicinal plant for more than two thousand years. I. (Ger). Pharmazie 17: 467-479. LC: RS1 P673.

A review with special emphasis on researches on the distribution, physiology and biosynthesis of alkaloids.

1352. PFEIFER, S. 1962. The opium poppy; medicinal plant for more than two thousand years. II. (Ger). Pharmazie 17: 536-554. LC: RS1 P673.

Review of the distribution of alkaloids, theories and experimental findings on biosynthesis of alkaloids.

1353. PFEIFER, S. 1964. Red-colored alkaloids of the genus *Papaver*. V. Papaverrubine B. (Ger). Pharmazie 19: 678. LC: RS1 P673.

From *P. glaucum*.

1354. PFEIFER, S. 1964. Glaudine, a new poppy alkaloid. (Ger). Pharmazie 19: 724. LC: RS1 P673.

Isolated from *P. glaucum*.

1355. PFEIFER, S. 1965. Occurrence of glaudine in opium and *Papaver rhoeas* L. Pharmazie 20: 240. LC: RS1 P673.

1356. PFEIFER, S. 1966. Investigations on the alkaloids of the genus *Papaver*. (Ger). Pharmazie 21: 61-62. LC: RS1 P673.

Alkaloids were isolated from *P. rhoeas*, *P. glaucum*, *P. oreophilum* and *P. caucasium*.

1357. PFEIFER, S. 1966. Alkaloids of the genus *Papaver*. XV. Isolation of (-)-isocorypalmine from opium. (Ger). Pharmazie 21: 492. LC: RS1 P673.

1358. PFEIFER, S. 1966. Paper and thin-layer chromatographic characterization of the alkaloids of the genus *Papaver*. (Ger). J. Chromatog. 24(2): 364-371. 475 J824.

Data for more than 50 alkaloids for which the structure is known.

1359. PFEIFER, S. 1966. Structure of porphyroxine (papaverrubine D). J. Pharm. Pharmcol. 18(2): 133-134. FD.

Further chemical characterization of porphyroxine.

1360. PFEIFER, S. 1969. Alkaloids of the genus Papaver. XXXI. Thin-layer chromatographic characterization of alkaloids of the genus Papaver. (Ger). J. Chromatogr. 41(1): 127-131. 475 J824.

R_f data are given for 32 Papaver alkaloids in 18 thin-layer chromatographic systems.

1361. PFEIFER, S., and S. K. BANERJEE. 1964. On the red pigment alkaloids of the genus Papaver. (Ger). Pharmazie 19: 286-289. LC: RS1 P673.

In a study of 30 species and subspecies 6 papaverrubines were found to be widely distributed. Data is given for the occurrence of the alkaloids in P. rhoeas during different stages of development.

1362. PFEIFER, S., and S. K. BANERJEE. 1965. Red colored alkaloids of the genus Papaver. IV. Papaverrubines A and E. (Ger). Arch. Pharm. 298(6): 385-394. 396.8 Ar2A.

Chemical separation of the 2 alkaloids from P. rhoeas.

1363. PFEIFER, S., S. K. BANERJEE, L. DOLEJS, and V. HANUS. 1965. Red-colored alkaloids of the genus Papaver. VI. Structure of papaverrubines. Mass spectrometry of the rhoeadine alkaloids. (Ger). Pharmazie 20(1): 45-46. LC: RS1 P673.

1364. PFEIFER, S., and H. DÖHNERT. 1967. Red-colored alkaloids of the genus Papaver. X. Papaverrubine G. (Ger). Pharmazie 22(6): 343. LC: RS1 P673.

Papaverrubine and alpinine were isolated from P. alpinum subsp. alpinum at the half-mature stage of growth.

1365. PFEIFER, S., and H. DÖHNERT. 1968. Alkaloids of the genus Papaver. XXX. Subspecies of Papaver alpinum L. (Ger). Pharmazie 23(10): 585-589. LC: RS1 P673.

Fourteen alkaloids were isolated from 4 subspecies.

1366. PFEIFER, S., T. FIEDLER, and F. WEISS. 1962. Pharmacopoeial recommendations: Opium extract, opium, concentrated opium, powdered opium, opium tincture. (Ger). Pharmazie 17(6): 332-339. LC: RS1 P673.

Drug standards and preparations.

1367. PFEIFER, S., and V. HANUS. 1965. Alkaloids of the genus Papaver. V. Alkaloids of Papaver rhoeas L. (Ger). Pharmazie 20(6): 394. LC: RS1 P673.

1368. PFEIFER, S., and K. HEYDENREICH. 1961. The alkaloid spectrum of germinating poppies. (Ger). Naturwissenschaften 48(7): 222-223. 474 N213.

Figures are given for 5 alkaloids in 2-7 day old poppy seedlings of 6 varieties. Thebaine was present in much larger amounts than any of the others and it is suggested it is an intermediate in the metabolism of morphine alkaloids.

1369. PFEIFER, S., and K. HEYDENREICH. 1961. The narcotoline content of opium latex. (Ger). Naturwissenschaften 48(11): 431-432. 474 N213.

Narcotoline content of 3 varieties of the opium poppy was 1.59-2.56% of the fresh weight of the latex which was reduced on drying the latex for 24 hours. There was little additional change after 6 months storage.

1370. PFEIFER, S., and K. HEYDENREICH. 1962. The accumulation of poppy alkaloids between flowering and biological ripeness. A contribution to the problem of obtaining alkaloids from green poppy capsules. (Ger). Pharmazie 17(2): 107-114. LC: RS1 P673.

The recommended harvest date for green poppy capsules is 15 to 20 days after the start of flowering. At this stage morphine is about maximum, although secondary alkaloids have not reached their highest concentrations.

1371. PFEIFER, S., and L. KÜHN. 1965. Alkaloids of the genus Papaver. VI. Alkaloids of Papaver caucasicum Marsch.-Bieb. (Ger). Pharmazie 20(6): 394-395. LC: RS1 P673.

1372. PFEIFER, S., and L. KÜHN. 1967. Alkaloids of the genus Papaver. XXII. Isolation of L-(-)-pronuciferine and L-(-)-nuciferine from Papaver persicum Lindl. (Ger). Pharmazie 22(4): 221-222. LC: RS1 P673.

1373. PFEIFER, S., and L. KÜHN. 1968. Alkaloids of the genus Papaver. XXVI. Papaver caucasicum Marsch.-Bieb, P. persicum Lindl., P. triniaefolium Boiss., P. fugax Poir and P. polychaetum Schott & Kotschy. 1. Nonphenolic bases. (Ger). Pharmazie 23(4): 199-210. LC: RS1 P673.

1374. PFEIFER, S., and L. KÜHN. 1968. Alkaloids of the genus *Papaver*. XXVI. *Papaver caucasicum* Marsch.-Bieb., *P. persicum* Lindl., *P. triniaefolium* Boiss., *P. fugax* Poir. and *P. polychaetum* Schott & Kotschy. 2. Phenolic bases. (Ger). Pharmazie 23(5): 267-281. LC: RS1 P673.

From *P. caucasicum* 18 bases were isolated, and some were also found in the other plants of this study. Biosynthesis and biological activities were discussed.

1375. PFEIFER, S., and I. MANN. 1964. New *Papaver* alkaloids. (Ger). Pharmazie 19(12): 786. LC: RS1 P673.

Fourteen bases are present in *P. oreophilum* plants.

1376. PFEIFER, S., and I. MANN. 1965. Alkaloids of the genus *Papaver* VII. *Papaver glaucum* Boiss. & Hauskn. and *Papaver feddei* Schwz. (Ger). Pharmazie 20(10): 643-649. LC: RS1 P673.

P. glaucum contains predominantly alkaloids with a rhoeadine skeleton, distinguishing it from *P. somniferum*, *P. setigerum* and other species of this section of the genus. From *P. feddei* were isolated roemerine, glaucine and amurine. This is the first occurrence of glaucine in a *Papaver* species, although it is reported for other Papaveraceae.

1377. PFEIFER, S., and I. MANN. 1966. Alkaloids of the genus *Papaver*. XIII. Oreoline, a new *Papaver* alkaloid. (Ger). Pharmazie 21(4): 251-252. RS1 P673.

Isolated from *P. oreophilum*.

1378. PFEIFER, S., and I. MANN. 1966. Alkaloids of the genus *Papaver*. (Ger). Abh. Deutsch. Akad. Wiss. Berlin, Kl. Chem. 3: 315-317. 509 D482.

Alkaloids of *P. oreophilum* and *P. feddei*.

1379. PFEIFER, S., and I. MANN. 1968. Alkaloids of the genus *Papaver*. XXV. *Papaver oreophilum*. (Ger). Pharmazie 23(2): 82-98. LC: RS1 P673.

Alkaloids identified and newly reported for this species include oreodine, oreogenine, papaverrubine F, oreophiline, oreoline and N-methyloreoline.

1380. PFEIFER, S., I. MANN, L. DOLEJS, and V. HANUS. 1965. Alkaloids of the genus *Papaver*. X. Structure of oreodine and oreogenine. (Ger). Pharmazie 20: 585-586. LC: RS1 P673.

1381. PFEIFER, S., I. MANN, L. DOLEJS, V. HANUS, and A. D. CROSS. 1967. Alkaloids of the genus Papaver. XVII. Structure of mecambridine (oreophiline). (Ger). Tetrahedron Lett. 1967(1): 83-90. 385 T29.

From P. oreophilum.

1382. PFEIFER, S., I. MANN, and L. KÜHN. 1968. Alkaloids of the rhoeadine-papaverrubine group, bases with a new basic structure. (Ger). Pharm. Zentralh. 107(1): 1-27. MAM.

N-Methyl bases such as rhoeadine were found in P. rhoeas, glaudine in P. glaucum and oreodine in P. oreophilum.

1383. PFEIFER, S., and J. TEIGE. 1962. On porphyroxine and a new alkaloid from opium. (Ger). Pharmazie 17: 692-705. LC: RS1 P673.

A method for identifying both in fresh latex.

1384. PFEIFER, S., and D. THOMAS. 1966. Alkaloids of the genus Papaver. XIV. Papaver atlanticum Ball. (Ger). Pharmazie 21(6): 378. RS1 P673.

Rhoeadine and protopine were the 2 main alkaloids.

1385. PFEIFER, S., and D. THOMAS. 1966. Alkaloids of the genus Papaver. XVIII. Alborine, a new alkaloid from Papaver alboroseum Hulten. (Ger). Pharmazie 21(11): 701. LC: RS1 P673.

1386. PFEIFER, S., and D. THOMAS. 1967. Alkaloids of the genus Papaver. XXIII. Pavanoline, an ester alkaloid from Papaver anomalum. (Ger). Pharmazie 22(8): 454-455. LC: RS1 P673.

1387. PFEIFER, S., and D. THOMAS. 1972. Alkaloids of the genus Papaver. XXXVII. Papaver pannosum Schwz. (P. spicatum Boiss. & Bal. var. spicatum), P. anomalum Fedde, P. pseudocanescens Pop., P. alboroseum Hulten. (Ger). Pharmazie 27(1): 48-58. LC: RS1 P673.

Listing of the alkaloids in the species with their chemical properties.

1388. PHAM-HOANG HO and NIGUYEN-VAN-DUONG. 1960. Cay-co mien nam Viet-nam. Bo Quoc-Gia Giao-Duc Xat-Ban. 804 pp. SI: QK361 P53.

P. somniferum on p. 152.

1389. PHILP, J. 1933. The genetics of *Papaver commutatum* and its hybrids with *Papaver rhoeas*. J. Genet. 28(2): 169-174. 442.8 J823.

In hybrids, *P. commutatum* characters are dominant.

1390. PHILP, J. 1933. The genetics of *Papaver rhoeas* and related forms. J. Genet. 28(2): 175-203. 442.8 J823.

Various factors including color and doubleness of the flower, albinism and latex color were studied in crosses.

1391. PHOLBOON, P. 1965. A host list of the insects of Thailand. Dept. Agric. Royal Thai Govt., 149 pp. SB913 T5A5.

A fruit-sucking bug (*Nysius* sp.) listed on *P. somniferum* in Thailand.

1392. PICTET, A. 1904. The vegetable alkaloids. Translated, revised and enlarged by H. C. Biddle. John Wiley & Sons, New York. 505 pp. 391 P58V.

Chapter 24 (pp. 264-314) is devoted to the opium alkaloids.

1393. PIEPER, H. 1939. Comparative examinations of different varieties of the cultivated poppy, *Papaver somniferum*. (Ger). Landw. Jahrb. 89(3): 333-392. 18 L23Cl.

Cultivated poppies collected in Iran, Afghanistan, Turkestan, India and Europe were examined for morphological, phenological and chemical criteria resulting in a morphological-geographical key.

1394. PIEPER, H. 1939. Trials on combined cultivation of flax and carrots. (Ger). Forschungsdienst 8: 63-69. 241 D48F.

Poppies were not as suitable for growing with flax as carrots.

1395. PIETKIEWICZ, T. A. 1958. Contributions to diseases of oleaginous crops. (Pol; summ. Rus and Eng). Roczn. Nauk Roln., Ser. A, Rosl. 78: 199-218. 20.5 R59.

Peronospora arborescens is present in all of the important poppy-producing areas of Poland. In addition to *Papaver somniferum*, wild *Papaver* spp. are infected.

1396. PIJL, L. VAN DER. 1969. Principles of dispersal in higher plants. Springer-Verlag, Berlin. 154 pp. QK926 P5.

Seeds of _P_. _somniferum_ can be broadcast for a distance up to 15 m by the long pedicels which swing in strong winds dispersing the seed through apical pores of the capsule.

1397. PIKE, A. V. 1946. _Papaver orientale_. Gard. Chron. 119: 147. 80 G162.

Garden cultivation.

1398. PINXTEREN, J. A. C. VAN, and M. A. G. SMEETS. 1950. The determination of morphine content of opium (Dutch; summ. Eng). Pharmaceutisch Weekblad 85: 1-17, 48-59. 396.8 P4922.

Newer methods discussed for separation and determination of morphine in opium, with discussion of decrepancies in each method.

1399. PINXTEREN, J. A. C. VAN, and M. E. VERLOOP. 1963. Determination of morphine in poppy capsules by oxidation to pseudomorphine by potassium ferricyanide. (Ger; summ. Fr and Eng). Pharm. Acta Helv. 38(7-8): 437-441. 396.8 P4933.

1400. PIROVANO, A. 1927. Results of hybridization between _P_. _somniferum_ and _P_. _bracteatum_. (Ital). Ann. Bot. (Rome) 17(4): 171-194. 450 An71.

The diversity of the progeny may be influenced by the maturity of the ovary at the time of pollination. _P_. _somniferum_ is reported as having a latent tendency to parthenogenesis.

1401. PIZARRO, C. M. 1959. Sinopsis de la flora chilena. Universidad de Chile. 840 pp. 457.3 M92.

Papaveraceae (pp. 162-163) include _P_. _rhoeas_.

1402. PLATONOVA, T. F., P. S. MASSAGETOV, A. D. KUZOVKOV, and L. M. UTKIN. 1956. Alkaloids of the plants of the poppy family. (Rus). Zhurn. Obshchii Khim. 26: 173-180. 385 Z6AE.

The alkaloid content of 11 Papaveraceae were investigated including _P_. _hybridum_ and _P_. _pavoninum_.

1403. PLICHET, A. 1950. The production of opium in the world. (Fr). Presse Med. 58(33): 598-599. MAM.

A discussion of each country that cultivates poppies giving the amount produced and the legality of opium production.

1404. PLYASHKEVICH, A. M., and M. D. ZAMYSHLYAEVA. 1964. A continuously operating apparatus for the extraction of caffeine and morphine from plant material. I. Extraction, equilibrium data and investigation of mass transfer on models of disk and worm diffusers. (Rus). Med. Prom. SSSR 18(12): 22-26. R856 M4.

The worm diffuser has a higher productivity and efficiency than the disk apparatus.

1405. POBEGUIN, H. 1906. Essai sur la flore de la Guinee Francaise. Paris. 390 pp. 460.47 P75.

Papaveraceae (pp. 295-296) include *P. argemone*.

1406. POETHKE, W., and E. ARNOLD. 1951. The determination of morphine in poppy capsules and other parts of the poppy plant. II. (Ger). Pharmazeut. Zentralhalle Deutschland 90(5): 145-151. MAM.

Narcotoline which accompanies morphine in poppy capsules does not disturb the gravimetric estimation of morphine with chlorodinitrobenzene.

1407. POEY, S. B., and A. ABIMANJU. 1967. The separation of opium alkaloids in opialum by thin-layer chromatography. Suara Pharm. 10(4): 91-96. Pusat Dokumentasi Ilmiah Nasional, Djakarta, Indonesia.

Separation of 6 opium alkaloids using silica gel G plates.

1408. POLITIS, J. 1948. The influence of anesthetics and ice on the changing of color in certain flowers. (Fr). Compt. Rend. Hebd. Seances Acad. Sci. 227: 1166. 505 P21.

Chloroform, ether and freezing turn some anthocyanic flowers, including *P. rhoeas*, from red to violet.

1409. POLUNIN, O. 1969. Flowers of Europe. Oxford Univ. Press, London. 662 pp. SI: QK281 P78.

There are 12 species of *Papaver* including *P. somniferum* and *P. orientale* in the Papaveraceae on pp. 263-283.

1410. PONTOVICH, V. E. 1959. Sterile cultivation of the placenta of the poppy plant as a means of studying the formation of seeds and the synthesis of their storage products. (Rus; summ. Eng). Fiziol. Rast. 6(3): 303-311. 450 F58.

A very young placenta from 1-day old fruit grows without seed survival while up to 40 seeds (which develop normally) survive on the placenta from 5-day fruit. Addition of coconut milk increases the number of seeds surviving. Seeds isolated from the placenta are not able to develop on the same medium.

1411. PONTOVICH, V. E. 1961. Placenta and seed culture under sterile conditions as a method for studying the metabolism of developing fruits. (Rus; summ. Eng). Izv. Akad. Nauk SSSR, Ser. Biol. 2: 233-238. 511 Sa2B.

Ovules need to be attached to the placenta in order to synthesize oil on agar culture medium and germinate normally when ripe. Labeled glucose was utilized to form amino acids and oil.

1412. PONTOVICH, V. E. 1962. Metabolism of the placenta and seeds of red poppy and fat synthesis. (Rus; summ. Eng). Fiziol. Rast. 9(1): 32-49. 450 F58.

The placenta, with seeds, isolated from the fruit is capable of absorbing labeled acetate and glucose from an artificial medium and transforming it into fatty acids and fat.

1413. PONTOVICH, V. E. 1964. Acetate and the synthesis of amino acids in the oil poppy fruit. (Rus; summ. Eng). Fiziol. Rast. 11(5): 871-878. 450 F58.

Isolated placentas with their attached seeds converted labeled acetate into lipids and glucose into carbohydrates. Labeled glutamic acid was decarboxylated to aminobutyric acid in the placenta while in the seeds it was used in protein synthesis.

1414. PONTOVICH, V. E. 1970. The uptake and transformation of substances by poppy (Papaver somniferum L.) seed of different ages. (Rus; summ. Eng). Fiziol. Rast. 17(6): 1232-1239. 450 F58.

Isolated poppy seeds, 3-10 days after anthesis, can absorb substances through their entire surface. Labeled glucose and organic acids are metabolized normally.

1415. PONTOVICH, V. E., and H. KARIMOV. 1960. Variation in the amino acid content of fruits of the oil poppy. (Rus; summ. Eng). Fiziol. Rast. 7(2): 151-159. 450 F58.

Amino acids of fruit and leaf proteins are similar but the free amino acids are different. Amine nitrogen content was highest in the seeds and placenta of the young fruit.

1416. PONTOVICH, V. E., and H. KARIMOV. 1960. Variation of amino acid content in the fruits of oil poppy. Soviet Pl. Physiol. 7(2): 124-131. (Trans. from Fiziol. Rast. 7(2): 151-159. 1960). 450 F58AE.

At early stages (3 day) the fruit contains up to 18% protein and accumulates up to 28% during development and then falls with intensive fat synthesis. The placenta is a very active tissue, participating directly in formation of fat and protein precursors.

1417. PONTOVICH, V. E., and M. KUZ'MINA. 1969. On the content of free auxins in separate parts of the fruit of Papaver somniferum L. Soviet Pl. Physiol. 16(5): 701-708. (Trans. from Fiziol. Rast. 16(5): 843-853. 1969). 450 F58AE.

Free auxins were studied in the fruit during ontogeny. The ovules have a 2 peak curve; the placenta contained a large amount of auxin during the unpollinated bud stage.

1418. PONTOVICH, V. E., and L. M. PINCHUK. 1958. The volatile acid content of oil poppy fruits. (Rus). Dokl. Akad. Nauk SSSR 120(3): 585-587. 511 P444A.

The rate of formation of acids in the fruit and leaf varies during development being at a maximum in the fruit wall and, particularily in the placenta, when oil is being synthesized most rapidly. Acetic acid is the main organic acid in the fruit.

1419. PONTOVICH, V. E., and I. N. SVESHNIKOVA. 1966. Formation of Papaver somniferum L. embryos during cultivation of the ovules in vitro. (Rus; summ. Eng). Fiziol. Rast. 13(1): 105-113. 450 F58.

Ovules grown on a nutrient medium without the placenta did not show normal development. With the placenta present and the addition of growth regulators (adenine plus birch sap was best) 70% of the seeds developed.

1420. POPOV, M. G. 1957. On the relationships and the history of Papaver and Roemeria. (Rus). Bot. Zhurn. 42: 1389-1397. 451 R923.

A general phylogenetic consideration of the Papaveraceae and Fumariaceae, strongly influenced by the frequency of color and hue of the petals and modern distribution of the species.

1421. POPOV, M. G. 1970. Papaveraceae B. Juss. pp. 437-549. In V. L. Komarov. Flora of the U.S.S.R. Vol. 7: Ranales and Rhoeadales. Jerusalem, Israel. (Eng. ed.). 459.2 L54Ac.

Monograph treats 11 genera of Papaveraceae, 8 sections and 52 species of Papaver.

1422. POPOV, P., and I. DIMITROV. 1966. On some manifestations of heterosis effect in poppy grown for opium. (Bulg; summ. Eng). Rasteniev. Nauk 3(4): 25-42. 64.8 R18.

Heterosis effects are more pronounced in hybrid combinations in which the parents are ecologically distinct. Results are, higher yields of crude opium, seed and seed capsules and resistance to low temperature and bacteriosis.

1423. PORTYANKO, V. F., A. E. KOSTINA, M. K. DULOVA, and V. V. PORTYANKO. 1970. Distribution of chlorine and iodine in plants. Soviet Pl. Physiol. 17(1): 143-146. 450 F58Ae. (Trans. from Fiziol. Rast. 17(1): 169-173. 1970).

In P. rhoeas chlorine was located primarily in the stems, sepals and petals, iodine in the leaves, stamens and pistils.

1424. POTEBNIA, C. 1907. Mycological studies. (Ger). Ann. Mycol. 5(1): 1-28. 450 An76.

Erysiphe communis, Heterosporium groenlandicum and Oidium erysiphoides are found on P. somniferum in USSR.

1425. PREININGER, V. 1972. The pharmacology and toxicology of the alkaloids from the plants of the family Papaveraceae. Acta Univ. Palack. Olomucensis, Fac. Med. 61: 213-254.

Discussion of the pharmacological activities of the secondary alkaloids of Papaveraceae.

1426. PREININGER, V., J. APPELT, L. SLAVIKOVA, and J. SLAVIK. 1967. Isolation of chemistry of alkaloids of several Papaver species. XXXVII. Alkaloids from Papaver persicum and Papaver caucasicum. (Ger). Coll. Czech. Chem. Commun. 32(7): 2682-2686. 385 C68.

Six alkaloids were isolated from P. persicum and 5 from P. caucasicum.

1427. PREININGER, V., A. D. CROSS, J. W. MURPHY, F. SANTAVY, and T. TOUBE. 1969. Isolation and chemistry of the alkaloids from some plants of the genus *Papaver*. XLV. On the constitution of the alkaloid orientalidine. Coll. Czech. Chem. Commun. 34(3): 875-890. 385 C68.

From *P. orientale*.

1428. PREININGER, V., A. D. CROSS, and F. SANTAVY. 1966. Isolation and chemistry of the alkaloids from some plants of the genus *Papaver*. XXXIII. On the constitution of latericine. (Summ. Rus). Coll. Czech. Chem. Commun. 31(8): 3345-3352. 385 C68.

Isolated from *P. latericium*, *P. pilosum* and *P. monanthum*.

1429. PREININGER, V., J. HRBEK, JR., Z. SAMEK, and F. SANTAVY. 1969. Oxidation products of some aporphine alkaloids. XLVII. Isolation and chemistry of alkaloids of a few *Papaver* species. (Ger; summ. Eng). Arch. Pharm. & Ber. Deutsch. Pharm. Ges. 302(11): 808-814. 396.8 Ar2A.

The mechanism of the oxidation and the constitution of the green colored oxidation product of isothebaine were studied.

1430. PREININGER, V., L. HRUBAN, V. SIMANEK, and F. SANTAVY. 1970. Isolation and chemistry of the alkaloids from the plant of the genus *Papaver*. XLVI. The structure of the alkaloids PO-4, PO-5 and of the dehydrogenated alpha-coralydine. Coll. Czech. Chem. Commun. 35(1): 124-235. 385 C68.

Isolated from a number of *Papaver* sp. including *P. orientale*.

1431. PREININGER, V. L., and F. SANTAVY. 1967. Isolation and chemistry of alkaloids of several *Papaver* species. XXXII. Isolation of additional alkaloids from *Papaver orientale* L. (Ger; summ. Czech and Rus). Acta Univ. Palack. Olomucensis, Fac. Med. 43: 5-14.

The alkaloids nuciferine, mecambridine, isothebaine, thebaine, orientalidine, salutaridine and several unknowns were isolated from the entire blooming plant.

1432. PREININGER, V., and F. SANTAVY. 1970. Isolation and chemistry of alkaloids of the genus *Papaver*. LI. Isolation of alkaloids from *Papaver bracteatum* Lindl., *P. fugax* Poir. and *P. triniaefolium* Boiss. and identification of some earlier alkaloids isolated from plants of sections *Orthorhoiades*, *Mecones* and *Pilosa*. (Ger). Pharmazie 25: 356-360. LC: RS1 P673.

1433. PREININGER, V., V. TOSNAROVA, and F. SANTAVY. 1971. Isolation and chemistry of the alkaloids of the genus *Papaver*. LV. Isolation of the alkaloids and the chemotaxonomic evaluation of the plants *Papaver glaucum* Boiss. et Hausskn., *P. tauricolum* Boiss., *P. fugax* Poir. and *P. heldreichii* Boiss. (Ger; summ. Eng). Pl. Med. 20(1): 70-81. 450 P697.

Alkaloids of the 4 species were isolated and their taxonomic relationship was discussed.

1434. PREININGER, V., P. VACHA, B. SULA, and F. SANTAVY. 1962. Isolation of alkaloids from several *Papaver* species. (Ger; summ. Eng). Pl. Med. 10(2): 124-133. 450 P697.

Twelve species of *Papaver* were investigated for alkaloids. Morphine, codeine and thebaine were absent in all species.

1435. PREININGER, V., P. VRUBLOVSKY, and V. STASTNY. 1965. Occurrence of alkaloids in opium poppy seed (*Papaver somniferum* L.). (Ger). Pharmazie 20(7): 439-441. LC: RS1 P673.

After a patient experienced beneficial sedative effects from ingestion of 3-4 teaspoons of poppy seed, chromatographic studies were carried out on the seed. The alkaloids detected were in too small amounts to explain the effect.

1436. PRICE, J. R., R. ROBINSON, and R. SCOTT-MONCRIEFF. 1939. The yellow pigment of *Papaver nudicaule*. Part I. J. Chem. Soc. 1939: 1465-1468. 382 L84J.

The pigment is a nitrogenous diglucoside.

1437. *PRISTA, L. N., and P. MIRANDA. 1958. Assay of opium extract by paper chromatography. (Port). An. Fac. Farm. Porto 18: 151-157.

Water-solution of opium extract chromatographed and optical density determined in a photoelectric colorimeter.

1438. PROCHASKA, M. 1927. Capsule and plant investigations of the blue-seeded, lowland Austrian poppies. (Ger). Z. Pflanzenzucht. 12: 75-92. 450 Z36.

Studies of capsule form and size on seed weight.

1439. PROCHASKA, M. 1928. Contributions to poppy breeding. (Ger). Z. Pflanzenzucht. 13: 247-252. 450 Z36.

Ovules regularly aborted in a poppy line causing the capsules to appear striated due to empty locules.

1440. PROCHASKA, M. 1928. Observations on the occurrence of _Peronospora arborescens_ (false mildew) on _Papaver somniferum_. (Ger). Fortschr. Landw. 3: 165-167. 19 F77.

In Austria.

1441. PROCHASKA, M. 1928. Some species of poppy found in Austria and adjacent countries. (Ger). Gartenbauwissenschaft 1(3): 286-296. 80 G195.

Nine varieties of _Papaver_ are discussed, with special reference to their seed and capsules.

1442. PROCHASKA, M. 1930. Contribution to capsule and seed formation of Papaveraceae with special reference to the garden poppy. (Ger). Gartenbauwissenschaft 3: 277-284. 80 G195.

Comparison of the capsules and seeds of _P. somniferum_, _P. rhoeas_, _P. paeoniflorum_ and their varieties.

1443. PROCHASKA, M. 1933. Influence of harvest time of poppies on consumption value and the viability of seed. (Ger). Gartenbauwissenschaft 7(4): 458-466. 80 G195.

The following changes occur with seed maturity in _P. somniferum_: the length and width of the seed and the 1000-seed weight increases; the original white color changes through red, violet, brown and finally blue-grey; the dry weight and fat content increases but no morphine is present.

1444. PROCHAZKA, F. 1952. The connection between several morphological characteristics of the poppy, between the quantity and size of the seeds, resistance to black rot (_Cladosporium herbarium_) of the pods of the poppy, and utilization of these observations for selection. (Czech; summ. Rus). Ceskoslov. Akad. Zemedel. Sborn. 25: 13-20. 19.5 C332C.

The intensity of infection is dependent on the form of the capsule. The best harvest occurs from those capsules with an ovate shape in which a large amount of surface is exposed to the sun. Seed harvest increases with an increase in the number of rays of the stigma.

1445. PRODAN, I. 1923. Flora pentru determinarea si descrierea plantelor ce cresc in Romania. I. Cluj, Rumania. 1152 pp. SI: 581.9498 P96.

Papaveraceae (pp. 449-457) include _P. pyrenaicum_, _P. somniferum_, _P. argemone_, _P. hybridum_, _P. dubium_ and _P. rhoeas_.

1446. PROKOFIEV, A. A. 1967. Physiological features of fruits and seeds of oil plants. (Rus). Biokhim. Fiziol. Maslich. Rast. 2: 112-139.

Transpiration greater in fruits of poppy than in leaves.

1447. PROKOFIEV, A. A., and M. T. GODNEVA. 1957. Significance of photosynthetic activity of opium poppy fruits for development of seeds and fat accumulation in them. Proc. Acad. Sci. USSR, Bot. Sci. Sect. 114(1/6): 99-102. 511 P444.

For 10-12 days after flowering photosynthesis of the pods is equal to that of the leaves of the middle whorl and the amount of chlorophyll is approximately that of the leaves. If the fruit or the leaves are placed in the dark, there is a decrease in the amount of seeds in the fruit.

1448. PROKOFIEV, A. A., and M. T. GODNEVA. 1957. The role of the photosynthetic activity of the fruits of the oil poppy in seed development and oil accumulation. (Rus). Dokl. Akad. Nauk SSSR 114(2): 438-441. 511 P444A.

When the capsules, but not the leaves, were kept covered after flowering, fewer seeds were produced containing 3% less oil. When the leaves were covered and the capsules left uncovered, the number of seeds was also reduced and their oil content declined from 49-21%.

1449. PROKOFIEV, A. A., and K. M. KATS. 1961. Transpiration of fruit of oil-bearing plants. (Rus). Dokl. Akad. Nauk SSSR 139: 744-747. 511 P444A.

Poppy capsules transpire more than the leaves.

1450. PROKOFIEV, A. A., and K. M. KATS. 1963. Transpiration of fruits and inflorescences depending on the intensity of meteorological factors and the age of plants. (Rus; summ. Eng). Fiziol. Rast. 10(2): 204-211. 450 F58.

The rate of transpiration was greater in fruits and inflorescences of poppy than in leaves and was maximal during flowering.

1451. PROKOFIEV, A. A., and K. M. KATS. 1964. Interrelation between transpiration in leaves and fruits. (Rus; summ. Eng). Fiziol. Rast. 11(3): 448-456. 450 F58.

The fruits of the oil poppy are the first to be supplied with water under conditions of soil water deficiency. The level of transpiration depends on the state of the seeds; fruits with killed seeds have a lower water requirement.

1452. PROKOFIEV, A. A., and V. KHOLODOVA. 1959. Water content and ripening of seeds. (Rus; summ. Eng). Fiziol. Rast. 6(2): 190-196. 450 F58.

In oil poppy, moisture content of the seed could be used as an index of maturity and can be correlated with the moisture of the air inside the capsule. Maturity of the seed is indicated by disappearance of monosaccharides and by oil accumulation.

1453. PROKOFIEV, A. A., and V. P. KHOLODOVA. 1968. Changes in water content of ripening seeds. (Rus; summ. Eng). Fiziol. Rast. 15(6): 1022-1031. 450 F58.

Moisture content is high at early stages of seed development, then decreases independently of the moisture of the surrounding tissues or of the relative humidity.

1454. PROKOFIEV, A. A., and G. V. NOVITSKAYA. 1957. Lipase activity and fat accumulation in flax and poppy seeds. (Rus). Dokl. Akad. Nauk SSSR 116(2): 273-276. 511 P444A.

Rates of lipase activity and fat accumulation were low in young seeds but they increased rapidly during development and then decreased during ripening.

1455. PROTSENKO, E. P. 1954. Pathogenic mycoflora of the Main Botanical Garden. (Rus). Trudy Glavn. Bot. Sada. 4: 183-204. 451 M854T.

Botrytis cinerea and Peronospora arborescens collected on cultivated plants of Papaver somniferum in August.

1456. PRUNER, G. 1959. Determination of morphine in the poppy capsule. (Ital; summ. Fr, Eng and Ger). Rendiconti Ist. Super. Sanita 22(7): 710-716. 449.9 R66.

A modified cerimetric method.

1457. PRUNER, G. 1959. Preliminary note on the determination of morphine in opium and recognition of the country of origin. (Ital; summ. Fr, Eng and Ger). Rendiconti Ist. Super. Sanita 22(7): 717-726. 449.9 R66.

Determination of porphyroxine-meconidine and the transmission curve in the ultra-violet were characteristic for the country of origin in opium from Turkey, India and Persia.

1458. PRUNER, G. 1961. The utility of the latex of Papaver orientale in ascertaining the origin of opium. (Ital; summ. Eng). Rendiconti Ist. Super. Sanita 24: 699-710. 449.9 R66.

An extract of latex from P. orientale was added to an extract of opium to facilitate the identification in a single step of opium from the Mediterranean region.

1459. PRUNER, G., and F. DENTICE DI ACCADIA. 1961. The influence on morphine stability of some fungi found in opium. (Ital; summ. Eng). Rendiconti Ist. Super. Sanita 24(9): 623-628. 449.9 R66.

Aspergillus and Candida were isolated from samples of Turkish opium. Morphine showed no decrease in uncontaminated samples stored for periods up to 2 years but when inoculated with Aspergillus for 1 month the content was reduced significantly.

1460. PRZYBOROWSKI, J. 1922. Genetical studies on Papaver somniferum L. I. (Ger). Z. Pflanzenzüch. 8(3): 211-236. 450 Z36.

Inheritance of seed color, flower color, flowering times, capsule, etc. in cultivated varieties.

1461. PSAREVA, M. M. 1939. The results of work on poppy breeding. (Rus). Selekc. & Semenov. 9(1): 16-19. 619 Se5.

Seed color is inherited and is not related to the oil content. Yield of seed is not affected by branching and shape of the capsule.

1462. PSAREVA, M. M., and A. A. KOTOV. 1953. Dual purpose use of poppy and mechanization of its culture. (Rus). Dostizheniia Nauk Peredovogo Opyta Sel'sk. Khoz. 12: 57-60. 20 D742.

Large machinery.

1463. PURI, H. S. 1971. A comparative study of folklore vegetable drugs of Europe and India. Acta Phytother. 18(2): 21-33. 450 Ac88.

P. rhoeas flowers are anodyne and expectorant in Europe while in India the milk from the capsule is used as a narcotic. P. somniferum capsules are anodyne, narcotic and used in cough medicines in Europe and for relieving pain in India.

1464. PUSZTAI, A. 1964. Hexosamines in the seeds of higher plants (Spermatophytes). Nature 201: 1328-1329. 472 N21.

Glucosamine was found to occur in a bound form as a glycoprotein in the seeds of 14 plants, including poppy. An additional hexosamine may be present as a polysaccharide.

1465. QUEZEL, P., and S. SANTA. 1962. Nouvelle flore de l'Algerie. I. Editions du Centre National de la Recherche Scientifique, Paris. 558 pp. SI: 581.965 Q5.

There are 7 species of Papaver including P. somniferum in the Papaveraceae on pp. 376-380.

1466. RAABE, R. 1957. Perithecia of Erysiphe polygoni in Iceland poppy. Pl. Dis. Reporter 41(8): 694-695. 1.9 P69P.

In California.

1467. RADULESCU, E., and E. PERSECA. 1964. On the biology of Pleospora papaveracea (de Not.) Sacc. (Ger). Rev. Roumaine Biol., Ser. Bot. 9(1): 19-33. QK1 R4.

This disease, one of the most serious of poppy, is favored by high plant density and poor nutrition and reduced by early sowing and choice of variety. Mahurele and Cluj A are only slightly infected. Seed treatment did not entirely prevent infection.

1468. RADULESCU, E., E. PERSECA, and E. DOCEA. 1961. A contribution to the control of poppy helminthosporiosis (Pleospora papaveracea (de Not.) Sacc.) by chemical and agrotechnical means. (Rum; summ. Rus, Fr and Eng). Lucr. Sti. Inst. Agron. "N. Balcescu", Ser. B 5: 333-342. 106.4 B854B.

Pleospora papaveracea increased in direct ratio to sowing density. Seed treatment with fungicides noticeably reduced infection; best results with liquids, especially germisan and gramisan.

1469. RAGALLER, F. 1965. Long-term comparison of spring oil crops in central Germany. (Ger; summ. Rus and Eng). Albrecht-Thaer-Arch. 9(12): 1099-1112. 18 AL1.

In a comparison of 7 spring oil-seed crops with winter rape, poppy showed wide fluctuations in yield.

1470. RAINIO, A. J. 1929. On the intersexuality of the genus Papaver. (Ger; summ. Fin). Ann. Soc. Zool. Bot. Fenn. Vanamo 9(5): 258-285. 410.9 Su7.

Morphologic intermediates between stamens and carpels were studied in P. somniferum polycephalum, P. orientale, P. nudicaule and P. hybridum. The history of previous observations is given.

1471. RAJAGOPALAN, S. 1943. A search for porphyroxine in Bengal opium. Curr. Sci. 12(1): 24. 475 Sci 23.

Unable to isolate porphyroxine by reported methods.

1472. RAJAGOPALAN, S. 1945. The search for porphyroxine in Indian opium. J. Org. Chem. 10(3): 175-178. 381 J827.

The author failed to find porphyroxine in Benares opium and suggests that the alkaloid may be impure codeine.

1473. RAKSHIT, J. N. 1926. The determination of total alkaloids, sugar and oily substances in opium. Analyst 51: 491-495. 382 Anl.

Opium samples grown in various areas of India were analyzed and differences are tabulated.

1474. RAKSHIT, J. N. 1942. Indian opium: Its principal groups of chemical constituents. Sci. & Cult. 8(1): 16-18. 475 Sci24.

The constituents of opium are, microbes, enzyme, gums, resins, inorganic radicals, non-basic C compounds, bases, gases like CO_2, O_2, N and alkaloids.

1475. RAMANATHAN, V. S. 1963. Recovery and determination of papaverine, papaveraldine (xanthaline), thebaine and cryptopine from Indian opium. Indian J. Technol. 1(10): 388-390. 475 In22.

Opium from different Indian localities was analyzed for minor alkaloids. It is suggested that papaveraldine does not occur in opium but is formed from papaverine during isolation.

1476. RAMANATHAN, V. S. 1966. Progress in the production of opium and opium alkaloids in India. Sci. & Cult. 32(1): 3-8. SI: 505.54 S41.

Opium poppy is cultivated in an area of about 21,000 ha which produces almost 70% of the world supply of raw opium of which 90% is exported. Of the total quantity of morphine produced in the world, nearly 85% is converted to codeine and 10% to dionine.

1477. RAMANATHAN, V. S., J. C. PAL, and C. RAMACHANDRAN. 1966. Narcotine in Indian opium. Bull. Narc. 18(4): 25-29. LC: HV5800 B8.

Narcotine content ranged from 5.62-7.68% depending on the district in which it was grown.

1478. RAMANATHAN, V. S., K. PRASAD, and R. M. GUPTA. 1965. Absorption of morphine from opium by porous earthen pots. Bull. Narc. 17(4): 21-25. LC: HV5800 B8.

In India, raw opium is collected and stored in unglazed earthen pots which absorb 8.5% of the potential morphine. It is suggested that plastic containers be used.

1479. RAM AYYAR, C. S. 1927. A bacterial soft rot of garden poppy. India Dept. Agric., Mem., Bact. Ser. 2: 29-33. 448.3 In2.

The rot of *P. rhoeas* is characterized by blackening of the stem followed by disintegration of the tissue. The causal organism, *Bacillus papaveris*, is described.

1480. RAMIREZ-GOYENA, M. 1909. Flora Nicaraguense. Managua, Nicaragua. 1064 pp. SI: QK220 R17.

The Papaveraceae are given on pp. 177-178 and include *P. somniferum*.

1481. RANGACHARI, P. N., B. M. SAYAGAVER, and A. F. MASCARENHAS. 1966. Chemical examination of callus tissue of *Papaver somniferum* grown *in vitro*. Indian J. Chem. 4(4): 191-193. 385 In294.

Ethanolic extract yielded an ultraviolet absorbing ester containing phthalic acid.

1482. RANGANATHAN, B., A. F. MASCARENHAS, B. M. SAYAGAVER, and V. JAGANNATHAN. 1963. Growth of *Papaver somniferum* tissue *in vitro*. *In* Plant tissue and organ culture: a symposium, Dec. 22-29, 1961. Delhi, India. pp. 108-110. 451 Sy66P.

Callus tissue isolated from the stem of seedling opium poppies was maintained for over a year by monthly subcultures on a basal medium to which growth substances were added.

1483. *RANNINGER, ____. 1916. The poppy root weevil (*Coelioides fuliginosus* Marsh.), its damage and its control. (Ger). Z. Angew. Ent. III, 1916: 383-387. 421 Z36.

Infection of roots of *P. somniferum* by *Coelioides fuliginosus*.

1484. RANNINGER, R. 1951. Transplanting of poppy. (Ger). Bodenkultur 5: 390-391. 19 B635.

1485. RANOJEVIC, N. 1938. Contribution to the Macedonian fungus flora. (Ger). Hedwigia 77(5/6): 233-242. 450 H35.

Peronospora arborescens on *Papaver somniferum* in Yugoslavia.

1486. RAPIN, J. 1941. Native oil plants. (Fr). Rev. Hort. Suisse 14(2): 40-43. 80 R3212.

Information is given for *P. somniferum* on botanical characteristics, economic importance, influence of climate, soil and fertilizers, diseases, planting and harvest.

1487. RAPOPORT, H., N. LEVY, and F. R. STERMITZ. 1961. Distribution of radioactivity in morphine from biosynthesis with carbon-14 dioxide. J. Amer. Chem. Soc. 83: 4298-4300. 381 Am33J.

Determined that a symmetrical intermediate is not involved in morphine synthesis by *P. somniferum*.

1488. RAPOPORT, H., F. R. STERMITZ, and D. R. BAKER. 1960. The biosynthesis of opium alkaloids. I. The interrelationship among morphine, codeine and thebaine. J. Amer. Chem. Soc. 82(11): 2765-2772. 381 Am33J.

The alkaloids isolated from *P. somniferum* plants grown in labeled CO_2 indicated, that thebaine is the precursor and morphine is the storage product formed from codeine demethylation.

1489. RASMUSON, H. 1920. A few genetical experiments with *Papaver rhoeas* and *Papaver laevigatum*. (Ger). Hereditas 1: 107-115. 442.8 H42.

Hybrids were studied for peduncle hairs, color of the latex, flower color and leaf color.

1490. RASMUSSEN, H. B., and K. ILVER. 1945. Orienting investigations on the morphine content of *Papaver somniferum* during the growth of the plant. (Dan; summ. Eng). Dansk Tidsskr. Farm. 19: 71-106. 396.8 D23.

Comprehensive analysis of the morphine content of various parts of the plant during development.

1491. RASMUSSEN, H. B., and O. LANNG. 1948. Determination of morphine in poppy capsules. Method and preliminary results. (Dan; summ. Eng). Dansk Tidsskr. Farm. 22(9): 201-217. 396.8 D23.

Morphine was determined polarographically. Higher temperature and less rainfall were responsible for the higher morphine content of poppy capsules in 1947 compared to 1946.

1492. RAUHALA, A. 1958. Erysiphaceae found in Finland and their known distribution. (Fin). Karstenia 4: 14-26. 451 K14.

Erysiphe communis on *P. somniferum*.

1493. RAUSCHER, K., and O. KORN. 1961. Water determination in food products by distillation procedures. (Ger; summ. Eng and Rus). Nahrung 5: 656-662. 389.8 N142.

Method was used to determine water in poppy seed.

1494. RAUTAVAARA, T. 1959. Poppy seeds against arteriosclerosis. (Fin). Puutarha 62: 198-199. 80 P99.

German varieties are suggested for Finland because the seeds are richer than those of southern Europe in the types of fatty acids which prevent cholesterol deposits in the circulatory system.

1495. RAVENNA, C. 1924. Effect of wounds on morphine production in poppies. (Ital). Staz. Sperim. Agrar. Ital. 57: 5-8. 105.4 St2.

Garden and opium poppies injured in May and June had higher morphine contents than uninjured plants.

1496. READ, B. E. 1922. A trip through the hills of Chihli, China. Pharm. J. 109: 580-583. 396.8 P49.

In some districts *P. somniferum* covered more area than cereal crops.

1497. RECHINGER, K. H. 1943. Flora Aegeae. Flora der inselin und halbinseln des Agaischen meeres. Springer Verlag, Wien. 924 pp. SI: 581.9499 R29.

There are 12 species of *Papaver* (with numerous varieties) including *P. setigerum*.

1498. RECHINGER, K. H. 1964. Flora of Lowland Iraq. J. Cramer, Weinheim. 746 pp. SI: 581.9567 R297.

The Papaveraceae are given on pp. 265-271 and include *P. rhoeas*, *P. macrostomum*, *P. glaucum* and *P. rogersii*.

1499. RECKIN, J. 1970. A contribution to the cytology of *Papaver aculeatum* Thunb. Caryologia 23(4): 461-464. 442.8 C25.

Possible relationship with *P. somniferum* is discussed since both have a somatic chromosome number 2n = 22.

1500. RECKIN, J. 1972. Hybrids within the genus *Papaver*. 2. Artificial hybrids of *Papaver somniferum* L. and *P. pilosum* Sibth. et Smith. (Ger; summ. Hung). Herba Hung. 11(1): 39-45. 71.8 H413.

Hybrids between *P. somniferum* (2n = 22) and *P. pilosum* (2n = 28) showed morphine, codeine, papaverine and narcotine contents similar to those of *P. pilosum*.

1501. REDGROVE, H. S. 1939. Why neglect poppy seeds--for bakery and confectionery? Food Manuf. 14(1): 24. 389.8 F736.

Greater use of poppy seed in baking is urged because they are nutritious with an agreeable nutty flavor.

1502. REDLICH, F. 1928. Narcotic poisons. (Ger). Apoth. Ztg. 43: 603-605. 396.8 Ap4.

A brief history of poppy culture and opium use and its spread eastward into India and China. Difficulties of national and international control are discussed.

1503. REHM, H. 1909. Ascomycetes exs. Fasc. 45. (Ger). Ann. Mycol. 7: 524-530. 450 An76.

Pleospora calvescens f. *papaveracea* reported on dry stems of *Papaver somniferum* in Germany.

1504. REICHART, G. 1961. Experiments in control of the poppy husk beetle. (Hung). Magyar Mezögazd. 16(27): 14-15. 19 M27.

Description of injury by *Ceutorhynchus macula-alba* and its control.

1505. REICHERT, I. 1940. Diseases of industrial and medicinal plants. Int. Bull. Pl. Protect. 14(4): 77M-78M. 464.8 In8.

Three leaf spot fungi, *Alternaria* sp., *Fusarium* sp. and *Helminthosporium* sp. and a root knot nematode, *Meloidogyne* were found on *P. somniferum* in Palestine.

1506. REID, E. M., and M. E. J. CHANDLER. 1926. Catalogue of Cainozoic plants in the Department of Geology. Vol. I. The Bembridge Flora. British Museum (Nat. Hist.). London. 206 pp. 402.1 B77C.

Papaver pictum is described from seed found on the Isle of Wight. (p. 111).

1507. REINMUTH, E. 1942. Parasitic leaf-drying, a disease of poppy culture. (Ger). Angew. Bot. 24(3/4): 273-277. 450 An4.

Notes on the incidence of shrivelling of poppy leaves due to *Helminthosporium papaveris*.

1508. REINMUTH, E. 1948. Helminthosporiosis of oil-poppy. (Ger). Z. Pflanzenkrankh. & Pflanzenschutz 55: 138-141. 464.8 Z3.

Helminthosporium papaveris on leaves of older plants.

1509. REITH, J. F. 1947. Manufacture of morphine from poppies cultivated in the Netherlands. (Dutch). T. N. O.-Nieuwe 2: 261-264. 475 T11.

The Kabay process for extracting morphine from straw became commercially feasible in 1933 but the labor costs were too high. During the war 1100 kg morphine were extracted from 500 tons of straw. With recent breeding for high morphine, it is hoped that enough can be obtained from extraction of straw to supply the country without importation.

1510. *REITH, J. F., and W. M. INDEMANS. 1950. Determination of morphine in the capsules of the blue poppy. Pharm. Weekblad 85(17/18): 309-319. 396.8 P4922.

1511. REMUSSI, C. 1959. Mutations induced by x-ray treatment. (Span). Revista Argent. Agron. 26(3-4): 108-109. 9 R327.

In an effort to overcome low morphine content and disease susceptibility of opium poppies in Argentina, mutations were induced in 3 varieties. A dosage of 25,500 r killed the seeds but at 13,000 r and 19,000 r there was some germination.

1512. REZSO, S. 1968. A Magyar flora es vegetacio rendszertani-növenyföldrajzi kezikönyve III. (Synopsis systematico-geobotanica florae vegetationisque Hungariae III). Akademiaikiado, Budapest. 506 pp. SI: QK310 S71.

The Papaveraceae are given on pp. 267-276 and include P. argemone, P. hybridum, P. dubium (4 varieties), P. rhoeas (many varieties) and many varieties of P. somniferum.

1513. RHEINWALD, H., and W. JESSEN. 1949. Nitrogen manuring trials with poppy. (Ger). Z. Pflernahr. Düng. Bodenk. 46: 190-195. 384 Z343A.

The form and timing of N fertilization had an insignificant effect on 4 different poppy cultivars.

1514. RHIND, W. 1862. A history of the vegetable kingdom. Blackie & Son, Glasgow. 720 pp. 452.8 R34.

General discussion of opium including, the cultivation of the poppy plants, harvest of the opium and its action on the body. Turkish and East Indian opium are compared.

1515. *RICHTMANN, ___. 1904. Cultivation of the opium poppy (Papaver somniferum) and the production of opium in U.S.A. Pharm. Rev., p. 426.

1516. RIDLEY, H. N. 1930. The dispersal of plants throughout the world. L. Reeve & Co., Ltd., Ashford, Kent. 744 pp. 463.38 R43.

Poppy seeds are mentioned as being dispersed by wind, by capsules entangled in wool, by birds eating them and even by animals ingesting them. P. alpinum seeds have been found in the stomachs of ice-preserved mammoths.

1517. RIEUF, P. 1960. Pathogenic and saprophytic organisms on plants in Morocco. (Fr). Cah. Rech. Agron. 9: 1-359. 14 M82.

Peronospora arborescens collected on Papaver somniferum, P. rhoeas, P. dubium and P. hybridum. Pleospora calvescens on Papaver somniferum. (p. 312).

1518. ROBERTS, M. F. 1971. Polyphenolases in the 1000g fraction of Papaver somniferum latex. Phytochemistry 10(12): 3021-3027. 450 P5622.

The enzyme complex oxidized a variety of phenolic substrates but would not oxidize the opium alkaloid intermediates reticuline and salutardinol.

1519. RÖDER, E. 1970. Solvent systems from isobaric components for thin-layer chromatography. (Ger). Mitt. Deutsch. Pharm. Ges. 40(6): 176-180. 396.8 Ar2A.

Opium alkaloids were separated.

1520. RÖDER, I. 1958. Anatomical and flourescence-optical investigations of seeds of the Papaveraceae. (Ger). Osterr. Bot. Z. 104: 370-381. 450 Os7.

Seed topography and seed coat anatomy described for a number of Papaver species including P. somniferum and P. orientale. The inner cell wall usually showed yellow fluorescence.

1521. ROELOFS, E. T. 1937. Phenotypical and genotypical eversporting varieties. Chap. II. Papaver somniferum polycephalum. Genetica 19: 481-517. 442.8 G282.

Comprehensive study of the effects of culture on polycephaly and the possible gene relationships.

1522. ROENSCH, H. 1972. Papaver bracteatum. 9. Biosynthesis of alkaloids of the rhoeadine type. Formation of alpinigenine from a tetrahydroprotoberberine precursor and tetrahydropalmatine metho salt. (Ger; summ. Eng). Eur. J. Biochem. 28(1): 123-126. OP501 E8.

Labeled tetrahydropalmatine methiodide is incorporated with high efficiency into alpinigenine.

1523. ROGERS, M. A. 1944. The poppy and its cultivation in Chile. (Span). Simiente 14: 14-21. 9.3 Si4.

Cultivation and harvesting of opium poppy in Chile.

1524. ROGERS, S. 1969. Studies on British poppies. I. Some observations on the reproductive biology of the British species of Papaver. Watsonia 7(2): 55-63. 450 W33.

Of the British poppies, P. rhoeas is self-incompatible, while P. dubium, P. lecoqii, P. argemone and P. hybridum are self-compatible. The proportion of self- to cross-fertilized seed is related to their floral biology such as anther height, flowering period, attractiveness to insects, etc.

1525. ROGERS, S. 1969. Studies on British poppies. II. Some observations on hybrids between Papaver rhoeas L. and P. dubium L. Watsonia 7(2): 64-67. 450 W33.

Poor germination of seeds from the artificial hybrids is due to poor embryo development. Cytological study of the meiotic behavior suggests the 2 species have a genome in common.

1526. ROGERS, S. 1969. Studies on British poppies. III. A note on sterility in Papaver rhoeas L. Watsonia 7(3): 128-129. 450 W33.

Varying degrees of sterility encountered in populations of P. rhoeas are shown to be due to structural heterozygosity.

1527. ROGERS, S. 1971. Studies on British poppies. IV. Some aspects of variability in the British species of Papaver and their relation to breeding mechanisms and ecology. Watsonia 8(3): 263-276. 450 W33.

The patterns of intra-specific variation in the British species of Papaver were studied using mainly characters of the ripe capsules. In P. rhoeas variation between populations is not great but in P. dubium and P. lecoqii variation is highly significant.

1528. ROLAND, A. E., and E. C. SMITH. 1969. The flora of Nova Scotia. Part 2. Proc. Nova Scotian Inst. Sci. 26(4): 279-743. SI: QK203 N8R74.

The Papaveraceae are given on pp. 398-400 and include *P. somniferum*, *P. rhoeas* and *P. dubium*.

1529. RÖMISCH, H. 1958. Morphine from the green poppy plant: Contribution to the possibility of its production. (Ger). Pharmazie 13(12): 769-777. LC: RS1 P673.

Morphine content of the green plant increased until petal fall and then decreased at capsule ripening time. Stability of the morphine during piling in heaps, drying by various methods, siloing and fermentation was compared. Morphine extraction from straw is 1.5-3.5 times as expensive as extraction from capsules.

1530. RÖMISCH, H. 1961. Spectrophotometric determination of secondary opium alkaloids and of the morphine content of green opium poppy which has been ensiled and dried in a rapid circulating drier. (Ger). Pharmazie 16(7): 373-377. LC: RS1 P673.

The alkaloid content remains the same if the poppies are ensiled or dried in a "spin-dryer" in which the material reaches 500-600 C for several seconds. Morphine, codeine, thebaine, narcotine and papaverine were determined.

1531. RÖNSCH, H. 1969. *Papaver bracteatum* Lindl. VII. New degradation path for *Papaver* alkaloids of the rheadine type. (Ger). Tetrahedron Lett. 1969(58): 5121-5124. 385 T29.

1532. ROSA, F. W. 1960. Malaria and opium control in Iran. Public Health Repts. 75(4): 352-354. 151.65 P96.

Poppy cultivation has been eradicated through effective legislation and treatment of addicts has been encouraged in Iran.

1533. ROSENGARTEN, F., JR. 1969. The Book of Spices. Livingston Publ. Co., Wynnewood, Pa. 489 pp.

In a chapter entitled "Poppy seed" pp. 369-373, there is a general discussion of cultivation methods and uses of the seed.

1534. ROSILLO, A. R. 1929. Variation of spots on the petals of *Papaver rhoeas*. (Span). Mem. R. Soc. Espan. Hist. Nat. 15(1): 213-216. 506 M263M.

A key based on the character of the spots is given to 14 forms.

1535. RÖSLER, C., S. PFEIFER and F. WEISS. 1960. Determination of morphine in opium. (Ger). Pharm. Zentralhalle 99: 349-359. 396.8 P492.

Errors in various methods of morphine determination in opium, opium tincture and opium concentrate are given and a new pharmaceutical method is discussed.

1536. ROTARU, A. I. 1971. Effect of mineral fertilization on the productivity of opium poppy. (Rus). Izv. Akad. Nauk Mold. SSR, Ser. Biol. Khim. Nauk 1: 12-15. LC.

The use of a complete N-P-K fertilizer decreased the vegetative period by 3-10 days without causing changes in height.

1537. ROTHMALER, W. 1949. Notulae systematicae. 4. Papaverses. pp. 42-44. Index Seminum Instit. Gaterslebense. 615 G22.

A number of new varieties and subspecies of _P_. _somniferum_ and _P_. _glaucum_ are described.

1538. ROTTLAND, M. and I. TURKOVIC. 1969. Separation of opium alkaloids by paper chromatography. (Fr; summ. Ger, Eng and Flem). J. Pharm. Belg. 24(5-6): 234-242. 396.8 J823.

1539. ROUX, B. 1862. Observations sur l'opium indigene. Paris. 8 pp. (Reprint from Ann. Agric. des Colonies, Dec. 1861). 77 R760.

Cultivation of a number of species and varieties of poppies, harvest of the opium and analysis for morphine and narcotine.

1540. ROVESTI, P. 1954. New per hectare yields in morphine from crops of _Papaver somniferum_ L. var. _album_ cultivated in Italy. (Ital). Piante Officinali 36: 209-212. 308.8 R52.

Details are given for cultivation of poppy in Italy and comparison of varieties for alkaloids.

1541. ROWAAN, P. A. 1948. The susceptibility of different plants to damage from salt and chlorine. (Dutch). Maandbl. Landbouwvoorld. 5: 290-300. 12 N383M.

Poppy shows damage at 4 g NaCl/liter soil moisture after receding of the floods.

1542. *ROZSYPAL, J. 1941. Study of _Stenocarus fuliginosus_ -- a poppy pest. (Ger; summ. Czech). Entomol. Listy 4(1/2): 34-60.

Biological observations and description of damage of this pest to poppy plants, with complete life-history of pest in Czechoslovakia.

1543. ROZSYPAL, J. 1942. A leaf miner in poppy leaves. (Czech). Entomol. Listy 5: 3-4.

The eggs of Stenocarus fuliginosus are laid at the root base. After they are hatched they live for 2-4 days as leaf-mining larvae and then move to the root.

1544. ROZSYPAL, J. 1957. Observations on a virus of poppy. (Czech; summ. Rus and Ger). Ceskoslov. Biol. 6: 438-440. LC: 442.8 C41.

Symptoms of a suspected virus disease of poppies including yellowing, sterility, mosaic streaking, etc.

1545. ROZSYPAL, J., and F. MRAZ. 1956. Bacterial infections of cultivated poppies in Czechoslovakia. (Czech; summ. Rus and Eng). Ceskoslov. Biol. 5: 218-226. LC: 442.8 C41.

A leaf spot caused by Xanthomonas papavericola and stem rot caused by Bacterium carotovorum affect both cultivated and wild poppies and are spread by insects. Prophylactic measures consist of seed selection, clean cultivation, avoidance of wet fields and insecticides.

1546. ROZSYPAL, J., and F. MRAZ. 1956. The occurrence of poppy bacteriosis in Czechoslovakia. (Ger; summ. Rus). Folia Biol. (Prague) 2: 233-238. 442.8 F712.

Leaf spot caused by Xanthomonas papavericola and a stem rot due to Erwinia aroideae on P. somniferum.

1547. RUSSELL, G. E. 1965. The host range of some English isolates of beet yellowing viruses. Ann. Appl. Biol. 55: 245-252. 442.8 An72.

Beet yellow virus was recovered from P. somniferum but not from P. rhoeas.

1548. *RUSSKOV, Y. A. 1970. Incorporation of Carbon-14 into alkaloids of Papaver somniferum. Sborn. Nauch. Rab., Vses. Nauch.-Issel. Inst. Lek. Rast. 1: 137-144.

1549. RUSTEMBEKOV, S. S. 1966. Formative processes and organogenetic stages in opium poppies. (Rus; summ. Eng, Ger and Fr). Vestn. Sel'.-Hoz. Nauki 11(2): 48-52. 20 V633.

Morphological details are given for the phases of germination, rosette stage, stem elongation, bud formation, flowering and ripening of the seed.

1550. RUSTEMBEKOV, S. S. 1967. The effect of meteorological conditions on the development of the opium poppy. (Rus). Trudy Kirg. Univ. Ser. Biol. Nauk 1967: 19-22.

Development of 2 opium poppy varieties was divided into 12 stages, each stage characterized by definite requirements for heat. Specific stages have certain heat requirements.

1551. *RUSTEMBEKOV, S. S. 1967. Seasonal changes in the photosynthetic capability of the opium poppy. (Rus). Trudy Kirg. Univ. Ser. Biol. Nauk 1967: 23-25.

A study of the photosynthetic rate and stages of organogenesis in *P. somniferum* using varieties, Przheval'skii-222 and P-153, indicating that the seasonal dynamics of photosynthesis depends on the time required to pass through the stages of organogenesis.

1552. RÜTHER, H. 1955. Results of experiments on the cultivation of oil crops. (Ger). Z. Landw. Versuchs- Untersuchungswesen 1(4): 331-339. 18 Z32.

P. somniferum had little value as an oil crop in dry regions because yields were so variable.

1553. RÜTHER, H. 1956. Results of cultivation trials with oil crops. (Ger). Z. Landw. Versuchs- Untersuchungswesen 2(4): 338-355. 18 Z32.

The effects of preceding-crop, rate and time of sowing, row-spacing, cultivation methods and varieties were studied in a number of oil plants including poppy.

1554. SACCARDO, P. A. 1880. French fungi collected by P. Brunaud, C. C. Billet, Abb. Letendre, A. Malbranche, J. Therry and Dom. Libert. Michelia 2: 39-135. R450 M58.

Phoma striaeformis var. *hysteriola*, blight on *P. somniferum* in Italy.

1555. SACCARDO, P. A. 1880. New or critical Venetian fungi or additions to the Venetian mycoflora. Ser. XII. (Lat). Michelia 2: 241-301 R450 M58.

Phoma morphaea, blight on *Papaver somniferum* in Italy.

1556. SADULLEJEVA, A. L. 1959. Pollen morphology of the Papaveraceae. (Rus; summ. Eng). Prob. Bot. 4: 11-50. 451.1 V962.

A study of 84 species in 28 genera. Ten types are described; the tricolpate is considered the most primitive.

1557. ST. JOHN, H. 1963. Flora of southeastern Washington and of adjacent Idaho. Outdoor Pictures, Escondido, Calif. 583 pp. SI: QK192 S14.

Papaveraceae are given on pp. 176-177 and include _P_. _argemone_ and _P_. _rhoeas_.

1558. SAINT-QUENTIN, M. 1952. The poppy is a choice oleaginous plant. (Fr). Rustica 25: 342. 14 R92.

Popular article on the cultivation of poppy in France.

1559. SAKURAI, H., and M. UMEDA. 1961. Analysis of opium alkaloids. X. New color reaction of narcotine and its application to colorimetric determination. (Jap; summ. Eng). J. Pharm. Soc. Japan. 81(5): 736-740. 396.9 P49.

1560. SALATA, B. and J. ROMASZEWSKA-SALATA. 1970. Materials for the study of parasitic fungi of Lublin. Part III. Peronosporaceae (Peronosporales). (Pol; summ. Rus and Fr). Ann. Univ. Mariae Curie-Sklodowska, Sect. C, Biol. 25(14): 137-147. 512 L96Ac.

Peronospora _arborescens_ collected on _Papaver_ _somniferum_ and _P_. _rhoeas_ in Poland.

1561. SALEH, J. S. 1956. Iran suppresses opium production. Bull. Narc. 8(3): 1-2. LC: HV5800 B8.

History of attempts to ban opium in Iran with a discussion of the new law which includes a ban on cultivation, treatment of addicts and control of illicit opium traffic.

1562. SALMON, C. E. 1919. _Papaver_ _rhoeas_, _P_. _dubium_ and the hybrid between them. New Phytol. 18: 111-117. 450 N42.

The hybrid was observed in the field. The characters resembled mostly the _dubium_ parent or were intermediate. No fertile seeds were produced.

1563. SAMUELSSON, G., B. M. YMAN, and N. DIDING. 1968. Ethylene oxide treatment of crude drugs. Part III. Influences on drugs containing alkaloids. Acta Pharm. Suec. 5(3): 199-204. MAM.

The morphine content of opium is unaffected by ethylene oxide treatment.

1564. SANDOR, M. 1958. Anomalies observed in the flowers of the blue poppy of Hatvan. (Hung; summ. Rus and Eng). Novenytermeles 7: 383-386. 64.8 N76.

Description of anomalies with illustrations.

1565. SAN MARTIN CASAMADA, R., and A. MOSQUEIRA TORIBIO. 1949. Photocolorimetric determination of morphine. (Span). Anales de la Real Acad. de Farm. 15: 343-348. W1 AC156.

1566. SANTAPAU, H. 1960. The flora of Khandala on the western ghats of India. Records of the Botanical Survey of India 16(1): 1-335. SI: QK358 S33.

The Papaveraceae including P. somniferum are given on p. 7.

1667. SANTAVY, F. 1962. Biogenesis of poppy alkaloids and systematic study of the plants of the genus Papaver. (Ger; summ. Rus). Coll. Czech. Chem. Commun. 27(7): 1717-1720. 385 C68.

From investigation of 28 species it was suggested that alkaloids containing 17 carbon atoms are biogenetically older.

1568. SANTAVY, F. 1963. Rhoeadine as the most widespread alkaloid of the genus Papaver; its constitution and biogenetic significance. (Ger). Abh. Deutsch. Akad. Wiss., Berlin, Kl. Chem. 1963(4): 235-245. 509 D482.

In this review, the alkaloids are listed for 22 species of Papaver in which half (11) contain rhoeadine. A biosynthetic pathway is given.

1569. SANTAVY, F. 1970. New alkaloid groups in the Papaveraceae. The present status of isolation, composition and biosynthesis. (Ger). Pl. Med. 19(2): 119-137. 450 P697.

A general article.

1570. SANTAVY, F., J. HRBEK, JR., and K. BLAHA. 1967. Isolation and chemistry of the alkaloids from some plants of the genus Papaver. XLI. Ord-curves of rhoeadine and related substances. Coll. Czech. Chem. Commun. 32: 4452-4459. 385 C68.

1571. SANTAVY, F., L. HRUBAN, and M. MATUROVA. 1966. Isolation and chemistry of the alkaloids from some plants of the genus *Papaver*. XXXV. The structure of the alkaloids amurensine and amurensinine. Coll. Czech. Chem. Commun. 31: 4286-4295. 385 C68.

1572. SANTAVY, F., J. L. KAUL, L. HRUBAN, L. DOLEJS, V. HANUS, K. BLAHA, and A. D. CROSS. 1965. Constitution of rhoeadine and isorhoeadine. Coll. Czech. Chem. Commun. 30: 3479-3500. 385 C68.

1573. SANTAVY, F., and M. MATUROVA. 1967. Isolation and chemistry of alkaloids of the genus *Papaver*. XL. Contribution to the constitution of oridine-alkaloids. (Ger; summ. Eng). Pl. Med. 15(3): 311-319. 450 P697.

Isolated from *P. oreophilum*.

1574. SANTAVY, F., M. MATUROVA, and L. HRUBAN. 1966. The isopavine structure of amurensine and amurensinine. J. Chem. Soc. (D) 1966: 36. 382 C4223.

1575. SANTAVY, F., M. MATUROVA, A. NEMECKOVA, H.-B. SCHRÖTER, H. POTESILOVA, and V. PREININGER. 1960. Isolation of alkaloids from a few poppy species. (Ger; summ. Eng). Pl. Med. 8(2): 167-178. 450 P697.

Rhoeadine and other alkaloids were isolated from 8 *Papaver* species.

1576. SANTAVY, F., and A. NEMECKOVA. 1962. Isolation of rhoeadine. (Czech). Czech. Patent 102,654: 1-3. U.S. Patent Office.

Commercial separation of rhoeadine from *P. rhoeas* plants.

1577. SANTAVY, F., and A. NEMECKOVA. 1967. Conversion of the alkaloid R-S (papaverrubine A) from *Papaver rhoeas* L. into isorhoeadine. (Ger). Coll. Czech. Chem. Commun. 32(1): 461-462. 385 C68.

Chemical conversion.

1578. SANTAVY, S. 1960. Polarography of the alkaloids occurring in the genus *Papaver*. (Ger). Pharmazie 15: 676-683. LC: RS1 P673.

Of the 9 groups of alkaloids in *Papaver* spp. only a few can be polarographically reduced. Morphine, codeine and thebaine are inactive.

1579. SARINGER, GY. 1961/1962. The winter poppy and its pests. (Hung; summ. Ger). Budapest, Novenyvedelmi Kutato Intezet. Evkon. 9: 185-194. 423.92 B85.

Ceutorhynchus macula-alba, *Stenocarus fuliginosus* and *Timaspis papaveris* and the damage they do to poppy.

1580. SARINGER, GY., and K. ZSOAR. 1963. Control of *Ceutorhynchus macula-alba*. (Hung). Magyar Mezögazd. 18(25): 12-13. 19 M27.

On *P. somniferum*.

1581. SARKANY, S. 1962. The heterosis problem in poppy and results of investigations in Hungary. (Hung). Budapest Magyar. Tudo. Akad. Biol. Csoport, Koslem. 5(1/2): 93-109. 442.9 B856.

1582. SARKANY, S., A. ANDRASFALVY, and L. F.-RIEDEL. 1959. Data on growth and development in poppy. Acta Agron. Acad. Sci. Hung. 9: 341-362. 19 Ac8.

Sowing in early spring and autumn was more productive than in May or June in three varieties studied under different conditions of daylength and temperature.

1583. SARKANY, S., and B. DANOS. 1957. Changes in the content of morphine and minor alkaloids in the various organs of the poppy during the vegetative period. (Ger). Acta Bot. Acad. Hung. 3: 293-316. 450 AC823.

Detailed study of the morphine content of the root, leaf, stem and fruit during growth.

1584. SARKANY, S., B. DANOS, and L. FARKAS-RIEDEL. 1963. Problems and results of the cultivation of poppy with high alkaloid content. (Ger). Abh. Deutsch. Akad. Wiss. Berlin, Kl. Chem. 1963(4): 247-260. 509 D482.

The alkaloid content of different cultivated hybrids, since 1957, was analyzed and the results tabulated.

1585. SARKANY, S., B. DANOS, and I. SARKANY-KISS. 1959. Studies on heterosis effects in poppy hybrids. (Ger; summ. Rus). Ann. Univ. Sci. Budapest Rolando Eotvos, Sect. Biol. 2: 211-237.

Hybrids grew 4-10 cm taller, flowered 2-4 days earlier and were higher in capsule and seed weight by 10-76%. Blue seed color was dominant and capsule form showed maternal influence.

1586. SARKANY, S., B. DANOS, and I. SARKANY-KISS. 1971. New effects of *Papaver somniferum* breeding: "Hybrid BC-2". (Ger, summ. Hung, Rus and Eng). Herba. Polon. 17(4): 410-421. 451 P87.

The development of the hybrid through many generations.

1587. *SARKANY, S., K. MICHELS-NYOMARKAY, and M. ANDRASFALVY-VICENTY. 1962. The distribution of the minor alkaloids during the development of the poppy varieties SB and SD. (Ger). Ann. Univ. Sci. Budapest Rolando Eotvos Nominatae, Sect. Biol. 5: 225-242.

Codeine content was higher in variety SB than in SD. Thebaine occurred in both varieties. During early stages of plant development, alkaloids accumulated mainly in the roots, but after flowering became concentrated mainly in the capsules.

1588. SARKANY, S., K. MICHELS-NYOMARKAY, and G. VERZAR-PETRI. 1967. Histological formation and fine structure of the poppy seed and young plants of different ages and their alkaloid formation. (Hung; summ. Ger and Rus). Herba Hung. 6(2): 239-252. 71.8 H413.

The presence and the accumulation of some alkaloids (thebaine, narceine, narcotine) in inactive and active meristematic tissue and in the endosperm were confirmed.

1589. SARKANY, S., K. MICHELS-NYOMARKAY, and G. VERZAR-PETRI. 1970. Histological and fine structural relationships and the problem of alkaloid formation in seeds and seedlings of Papaver somniferum L. (Ger). Pharmazie 25(10): 625-629. LC: RS1 P673.

The embryo, endosperm and testa of the seed lack latex and latex vessels but do contain alkaloids. In the seedling, the root and shoot meristems have a high alkaloid content, but also lack latex vessels.

1590. SARKANY, S., and E. PERCS. 1957. Histogenetical observations in the stem tip of Papaver somniferum L. (Summ. Rus and Fr). Acta Biol. Acad. Sci. Hung. 7(2-3): 183-201. 475 Ac85.

The shoot apex has 7 developmental phases; 3 are vegetative lasting 30-35 days, the 4th is transitional and the last 3 reproductive (of 15-20 days duration).

1591. SARKANY, S., I. SARKANY-KISS, B. DANOS, and L. F. RIEDEL. 1959. Studies on Papaver somniferum L. and selection of poppy varieties with greater capacity for morphine and seed yield. (Ger). Acta Bot. Soc. Hung. 5(1/2): 97-202. 450 Ac823.

The first part contains a very complete study of all aspects of the morphology of the poppy plants. The second part gives morphological and phenological characteristics of a large number of cultivars and results of various crosses for increased yield.

1592. SARKANY, S., I. SARKANY-KISS and G. VERZAR-PETRI. 1966. Distribution of commercially significant alkaloids in ripe capsules and stems and in single individuals of BC-2 poppy hybrids. (Ger). Abh. Deut. Akad. Wiss. Berlin, Kl. Chem. 3: 355-362. 509 D482.

The relative content of total alkaloids was less in the first developed main capsule than in the youngest side capsule indicating a movement from the older to the younger during ripening.

1593. SARKANY, S., I. S.-KISS, G. VERZAR-PETRI, and A. S. KOVACS. 1965. Comparative analysis of some lines of the hybrid poppy BC-2 from the viewpoint of pharmaceutical industry. Acta Agron. Acad. Sci. Hung. 14: 79-91. 19 Ac8.

In some of the lines the associate alkaloids were as high as that of the superior parent.

1594. SARKANY, S., R. VERZAR, A. MICHELS, and S. SARKANY. 1966. Studies on alkaloid formation in relation to tissue structure and organ differentiation in *Papaver somniferum* L. I. Studies on root tips. (Hung; summ. Ger). Herba Hung. 5(2/3): 40-50. 71.8 H413.

Alkaloids were detected in the tips of 2-3 day old roots before the development of latex vessels or latex.

1595. SATYANARAYANA, M. N., M. V. L. RAO, M. SRINIVASAN, and V. SUBRAHMANYAN. 1956. Poppy seed proteins. J. Sci. Industr. Res. (India) 15C: 211-212. 475 J82.

The seed of 4 varieties contained about 22% protein and were rich in thiamine and riboflavin.

1596. SAUNDERS, E. R. 1937. Floral morphology. A new outlook with special reference to the interpretation of the gynaeceum. Vol. I. W. Heffer & Sons Ltd., Cambridge. 132 pp. LC: QK659 S33.

The polycarpellate interpretation of the gynoecium is advocated for the Papaveraceae pp. 45-56.

1597. SAVILE, D. B. O. 1946. *Entyloma fuscum* and related smuts attacking Papaveraceae. Canad. J. Res., Sect. C, Bot. Sci. 24: 109-114. 470 C16C.

E. fuscum from *P. rhoeas* has been shown to attack *P. atlanticum*, *P. dubium*, *P. glaucum*, *P. monanthum*, *P. orientale*, *P. setigerum* and *P. somniferum*.

1613. SCHENCK, G., K.-H. FRÖMMING, and H.-J. KLUGE. 1962. The enzymatic and nonenzymatic oxidation of therapeutically active plant substances. XXIV. Morphine losses in poppy capsules (P. somniferum L.). (Ger). Pharm. Ztg. Ver. Apotheke-Ztg. 107: 1777-1778. 396.8 P496.

Phenoloxidase activity is responsible for the loss of morphine in crushed poppy capsules during storage at 20°C. Maximum loss occurred in the first 8 days and there was no further decrease after 24 days.

1614. SCHENCK, G., K.-H. FRÖMMING, W. WIECHULA, and E. SCHWALB. 1960. Enzymatic and nonenzymatic oxidation of therapeutically active plant substances. XIV. The action of phenoloxidase from Papaver somniferum on morphine. (Ger). Arch. Pharm. (Berlin) 293: 312-324. 396.8 Ar2A.

Phenoloxidase did not oxidize morphine alone, but did after the addition of caffeic or p-coumaric acids.

1615. SCHIJFSMA, L., M. HOESBERGEN, and F. E. NIJDAM. 1960. A study of the colour and other characters of the seed of some varieties of oil seed poppy. (Summ. Dutch). Euphytica 9: 127-140. 450 Eu6.

Development of shades of color is influenced by environmental conditions, position of the capsule on the plant and variety. The shade shows a high correlation with calcium oxalate content of the outer layer of the seed coat. Height of ridges on the seed coat varies with the variety.

1616. SCHLÖSSER, E. 1971. The beet yellow virus in Lebanon. Phytopathol Medit. 10(2): 213-214. 464.8 P565.

Infects P. rhoeas.

1617. SCHMID, H. 1945. Water-soluble substances from Papaver somniferum L. (Ger). Helv. Chim. Acta 28: 1187-1197. 385 H36.

Identification of substances in the aqueous extract of poppy straw.

1618. SCHMID, H., and P. KARRER. 1945. Water-soluble substances from Papaver somniferum L. (Ger). Helv. Chim. Acta 28: 722-740. 385 H36.

Fifteen water-soluble substances were isolated and identified from an extract of dry poppy straw, free of alkaloids.

1619. SCHMID, L., and R. HUBER. 1932. The coloring material of corn poppy (Papaver rhoeas) II. (Ger). Monatsch. Chem. 60(5/6): 285-294. 384 M74.

An anthocyanidine isolated from the flowers.

1620. SCHMIDT, E. 1901. On alkaloids of Papaveraceae. (Ger). Arch. Pharm. (Berlin) 239: 395-408. 396.8 Ar2A.

Chemical determination of a number of Papaveraceae alkaloids including those in P. somniferum.

1621. SCHMIDT, T. 1950. The occurrence of important diseases and pests on cultivated plants in Austria in 1949. (Ger). Pflanzenschutz. Ber. 4: 84-94. 464.9 P48.

Severe damage to opium poppy in 1949 due to heavy precipitation and frequent dew.

1622. SCHMIEDEKNECHT, M. 1958. Morphological investigations of the question of race formation in Helminthosporium papaveris Saw. (Ger). Arch. Mikrobiol. 28: 404-416. 442.8 Ar26.

Nearly 170 single spore isolates from seeds and infected parts of a number of Papaver species and varieties were compared. Several strains were clearly distinguishable, some stable and some very unstable.

1623. SCHMITLIN, B., J.-L. OUDIN, R. DUMAY, and J.-C. POISSON. 1967. Trials of various herbicides for weed control in poppy crops. (Fr). Compt. Rend. 4th Conf. Columa, Journees Etud. Herbic. 2: 596-607. SB951 C58.

Monalide, DNOC, dinoseb, ethyl xanthate, barban, chlorthiamid, dimethylxanthogen, methotryne and simazine were not suitable for poppy, but trichloracetic acid, dalapon, molinate, neburon, ioxynil and solan were promising herbicides.

1624. *SCHMITLIN, B., S.-L. OUDIN, and J. LOMBARD. 1969. Results of some weed control trials in poppy. (Fr). Compt. Rend. 5^e Conf. Com. Franc. Mauv. Herbes (COLUMA) pp. 804-816.

Aminotriazol can be used in poppy fields at rate 3 kg/ha. Di-allate at 1.5 kg/ha may control grasses. Asalam at rates up to 6-8 kg/ha applied pre-emergence is more promising.

1625. SCHNEIDER, R. 1953. Studies on the humidity requirements of parasitic fungi. (Ger). Phytopathol. Z. 21: 63-78. 464.8 P562.

Spore germination requirements for Helminthosporium papaveris and Verticillium albo-atrum isolated from poppy.

1626. SCHREIER, O. 1953. Worms in poppy capsules. (Ger). Pflanzenarzt 6(5): 4-5. 464.9 P482.

Damage caused by weevils and their control.

1627. SCHRÖDER, H. 1963. The influence of fertilizers in field trials on the content and yields of morphine in Papaver somniferum L. (Rus). Abh. Deutsch. Akad. Wiss. Berlin, Kl. Chem. 1963(4): 261-264. 509 D482.

Nitrogen fertilizers influenced favorably the morphine content and yield, phosphoric acid was indifferent and potassium had a negative effect.

1628. SCHRÖDER, H. 1965. Changes in the morphine content in ripening opium poppy capsules. (Ger). Pharmazie 20(3): 169-171. LC: RS1 P673.

Morphine content was highest 10-12 days before seed ripening and was maintained if the weather was dry, decreased if wet. Seed yield and content of protein and oil were not reduced by harvesting 10-12 days earlier.

1629. SCHRÖDER, H. 1966. Effect of mineral fertilizers and location on the morphine content and other qualitative and quantitative characteristics of the opium poppy (Papaver somniferum). (Ger). Pharmazie 21(10): 635-641. LC: RS1 P673.

There is no correlation between crude protein and oil content of the seed with the morphine content of the ripe capsule. 51.8% of N and 64.3% of the P_2O_5 added as fertilizer appeared in the seed while K and Ca showed up in the straw.

1630. SCHRÖDTER, H. and H. W. NOLTE. 1952. Field observations on the effect of temperature on the egg laying and larval development of the opium poppy capsule weevil, Ceuthorrhynchus macula-alba. (Ger). Nachrichtenbl Deutsch. Pflanzenschutzd. 6: 67-72. 464.9 N11.

The climate of middle Europe is favorable to outbreaks of weevils. The best temperature for egg laying is 20°-25° C.

1631. SCHROEDER, D. 1962. You can't overlook an oriental poppy. Org. Gard. & Farming 9(5): 37-39. 57.8 Or32.

Varieties and garden cultivation.

1632. SCHROPP, W. 1938. A contribution to the knowledge of potash deficiency symptoms in some oil and fiber plants. (Ger). Ernähr. Pflanze 34(10): 165-170. 57.8 Er6.

In poppy, potash deficiency became evident by a darkening of the leaf color, followed by a delay in flowering and a check in the development of the plant.

1633. SCHÜEPP, H., and S. BLUMER. 1963. On some mildews on ornamentals. (Ger; summ. Eng). Phytopathol. Z. 48: 329-336. 464.8 P565.

Erysiphe communis on *P. somniferum*.

1634. SCHULTZ, O. E., and J. SCHNEKENBURGER. 1965. On the problem of the determination of morphine in opium. (Ger). Arch. Pharm. (Berlin) 298(8): 548-559. 396.8 Ar2A.

Comparison of various methods.

1635. SCHULZ, H. 1921. On the correlation between the floral parts and geotropic movements of the flower stalk according to investigations, particularly on *Papaver*. (Ger). Jahrb. Wiss. Bot. 60: 1-66. 450 P93J.

In *Papaver*, the peduncle shows geotropic movements which can be halted by decapitation or by heavy wounding of the bud.

1636. SCHWAR, C. 1962. Studies on the antagonistic effect of wormwood (*Artemisia absinthium*) on different plant species. (Ger; summ. Rus and Eng). Arch. Gartenbau. 10: 409-418. 80 Ar2.

Plants of *P. somniferum* grown next to wormwood showed reduction in height the first year but there was no build-up of toxins in the soil.

1637. SCHWEER, W. 1918. Opium -- World Production. (Ger). Z. Allg. Wirtsch., Jena 12: 268-279.

1638. SCHWEIZER, G. 1931. On the anatomy of poppy seeds (*Papaver somniferum* L.). (Ger). Ber. Deutsch. Bot. Gest. 49(8): 414-423. 451 D48.

Detailed anatomy of the seed with various interpretations of seed structures.

1639. SCHWERDTFEGER, F. 1936. Poppy, mustard and buckwheat as larval control agents. (Ger). Forstarchiv 12(5): 69-78. 99.8 F7723.

Sowing poppies, mustard or buckwheat will not control may-beetles.

1640. SCOGGAN, H. J. 1950. The flora of Bic and the Gaspe Peninsula, Quebec. Bull. Natl. Mus. Canada 115: 1-399. SI: QK203 Q4S42.

The Papaveraceae are given on pp. 213-214 and include P. somniferum.

1641. SCOTT, J. 1877. Report on the experimental culture of the opium poppy for the season 1876-77. Bengal Secretariat Press, Calcutta. pp. 1-30, i-xxii. LC: SB295 O6S4.

Comprehensive report on growing poppies in India including soils, sowing of the seeds, varieties, diseases and injuries and the harvest of the seed.

1642. SEBERSTOV, V. V., and L. I. ARSJUHINA. 1968. Effect of microelements on the yield and content of active substances in the capsules of oil poppy. (Rus). Trudy Vessojuzn. Nauchno-Issl. Inst. Lekarstv. Rast. 13: 138-142.

In pot experiments, boron at 1 mg/kg increased yield of capsules by 19% and seeds by 63%. Molybdenum at 1 mg/kg increased capsule yield by 25% and seeds by 28%.

1643. SEDA, A. 1935. Combat against pests and diseases of domestic oil plants. (Czech). Cazove Otazky Zemedel. 45: 87-108. 19.5 C27.

Symptoms produced on opium poppy by Peronospora arborescens, Alternaria brassicae var. somniferi, Helminthosporium papaveris and the nematode, Heterodera schachtii are described and methods for control are recommended.

1644. SEKHAWAT, P. S., and K. L. KOTHURI. 1971. Amino acid composition of healthy and downy mildewed plants of opium poppy (Papaver somniferum). Indian Phytopath. 24(2): 403-405. 8 In2.

The concentration of individual amino acids, in general, was reduced in diseased plants or remained unchanged, except for tyrosine which was absent.

1645. SEKI, I. 1970. Studies on the morphine alkaloids and its related compounds. XIX. The Beckmann rearrangement of the oximes of dihydrothebainones and its Hofmann degradation products. Chem. Pharm. Bull. 18(6): 1269-1273. RM1 C5.

1646. SEKI, I., and H. TAKAGI. 1970. Studies on the morphine alkaloids and its related compounds. XVIII. Syntheses of N-substituted-morphinan dihydronormethines and o-alkylisoureas related to morphinan, norpethidine, or phenethylamine. Chem. Pharm. Bull. 18(6): 1104-1111. RM1 C5.

1647. SELMECI, G., G. VALOVICS, and L. SZLAVIK. 1967. Extraction of medicinal plants. I. Effect of temperature changes before the extraction on the diffusion of the active ingredients. (Ger). Pharmazie 22: 173-176. LC: RS1 P673.

Freezing to -17°C before extraction increases by 30% the amount of morphine extracted from *P. somniferum*.

1648. SENOV, P. L.. and V. E. CHICHIRO. 1971. Improving the efficacy of analysis of some drugs containing alkaloids. (Rus). Farmatsiya (Moscow), 20(4): 64-66.

1649. SERZANE, M. J. 1962. Plant diseases. Practical studies. (Latvian). Latvijas Valsts Izdevnieciba, Riga. 518 pp. 464 Se62.

Four diseases are reported on *Papaver*: *Alternaria brassicae* var. *somniferi*, *Bacterium papavereum*, *Peronospora arborescens* and *Helminthosporium papaveris*. (pp. 43, 78, 238 and 239).

1650. SESSOUS, G. 1942. Simplification of poppy culture. (Ger). Forschungsdienst 16: 404-405. 18 F772.

A successful harvest of poppy depends on early planting and cultivation at the correct time, so the plants are not too close together.

1651. SESSOUS, G. 1944. Mohn nicht verziehen! -- nur verhacken! Mitt. Landw. 59: 400. 18 D48M.

1652. SESSOUS, G., and H. SCHELL. 1940. Notes on poppy cultivation and its possible spread. (Ger). Forschungsdienst 9: 405-406. 241 D48F.

Effect of weather during different stages of development.

1653. SEVERIN, V., and E. DOCEA. 1966. Bacterial spots on leaves of poppy. (Rum). Probl. Agric. (Bucharest) 18(12): 55-56. 21 R862.

Xanthomonas papavericola on *Papaver somniferum* in Rumania.

1654. SEYMOUR, F. C. 1969. The Flora of Vermont. Vermont Agric. Expt. Sta. Bull. No. 660. 393 pp. SI: QK190 S52.

Papaveraceae (p. 189) includes _P_. _somniferum_.

1655. SHA, SHIH-YEN, and YU-CHUNG CHANG. 1965. Thin layer chromatography of alkaloids. (Chin; summ. Eng). Acta Pharm. Sinica 12(11): 754-757. MAM.

Opium alkaloids were separated.

1656. SHAFEEV, N. G. 1957. A case of intracapsular proliferation in _Papaver_ _somniferum_ L. (Rus). Bot. Zhurn. (Moscow) 42: 456-457. 451 R923.

Small leaf-like structures appeared in the flowers and there were no stamens.

1657. SHAKH, B. P. 1963. The effect of fertilizers on yield, morphine content of capsules and oil content of poppy seeds. (Rus). Vestn. Sel'skokhoz. Nauki, Min. Sel'sk. Khoz. Kaz. SSR 6(10): 26-31. 20 AK16.

Soaking seeds for 12 hours prior to sowing in a mixture of $MnSO_4$, $CuSO_4$, $ZnSO_4$ and H_3BO_3 increased yield 28.2%.

1658. SHARGHI, N., and I. LALEZARI. 1967. _Papaver_ _bracteatum_ Lindl., a highly rich source of thebaine. Nature 213: 1244. 472 N21.

Vast areas of _P_. _bracteatum_ are reported in the Albroz mountains in N. Iran at altitudes of 1,500-2,000 m. Latex from the green capsules contained 26% (dry weight) thebaine and no morphine.

1659. SHARKOV, V. I., N. I. KUIBINA, Y. P. SOLOV'EVA, and E. N. DVOZDEVA. 1965. The chemical composition of some plant tissues. (Rus). Sborn. Trudov. Vses. Nauchn.-Issled. Inst. Gidrolizn. Sul'fitno-Spirt. Prom. 14: 7-12. LC: P1 L42.

Analysis of _P_. _somniferum_.

1660. SHARROR, L. A. 1957. Deviations in the structure of the reproductive organs of the flower of poppies (_Papaver_ spp.). Bot. Zhurn. (Moscow & Leningrad) 42(8): 1249-1253. 451 R923.

Teratologies in stamens and pistils of _P_. _nudicaule_ and _P_. _oreophilum_.

1661. SHEBERSTOV, V. V. 1956. The part played by fertilizers in increasing opium poppy yields. Bull. Narc. 8(3): 42-47. LC: HV5800 B8.

Manure applied at the rate of 20-30 tons/ha increases the opium content 22-86% and remains effective during the second year. The greatest increase with artificial fertilizers is with additional phosphate.

1662. SHEKHAWAT, G. S. 1965. Present standard of poppy (*Papaver somniferum*) cultivation in Kota region of Rajasthan. Indian J. Agron. 10(4): 430-434. 22 In235.

Cultural practices and opium extraction are described with brief data on yields and economics.

1663. SHEKHAWAT, G. S. 1967. Cultivation studies in poppy. Indian J. Agron. 12(1): 83-85. 22 In235.

In a study of date-of-sowing and spacing, the highest yields resulted from planting in late October or early November with the optimum spacing being 30 cm between rows and 15 cm between plants.

1664. SHEKHAWAT, G. S., U. B. SINGH, and M. C. LODHA. 1963. Flower colour as an index of growth and development in poppy (*Papaver somniferum* L.): A preliminary study. Indian Agric. 17(1/2): 191-192. 22 In294.

Plants with different colored flowers show significant differences in the number of branches, bolls, capsules/boll and lancings. The white flower group produced a larger yield followed by pink.

1665. SHINYANS'KII, L. A., L. S. KAZARNOVSKII, N. YA. KARAVAI, and V. N. SOLON'KO. 1960. Extraction by ultrasound. II. Extraction of morphine. (Rus). Farm. Zhurnal Kiev 15(5): 48-49. MAM: W1 FA89.

Dry poppy plants were covered with water at 80°-85°C and exposed for 15-17 min to ultrasound waves at 500 kc. The degree of morphine extraction was the same as produced by 24 hour extraction in a diffusion battery.

1666. SHIPALOV, M. S., and S. D. MEKHTIKHANOV. 1968. Quantitative evaluation of the main alkaloids of opium. (Rus; summ. Eng). Priklad Biokhim Mikrobiol 4(4): 444-450. 385 P93.

Paper chromatographic method.

1667. SHOSTENKO, YU. V., and S. SH. MUSHINSKAYA. 1963. Obtaining opiate alkaloids from the calyxes of poppies. (Rus). Teoriya Prakt. Ionnogo Obmena, Akad. Nauk Kaz. SSR 1962: 176-181. LC: TP156 I6R4.

Paramorphine, narcotine and papaverine were isolated.

1668. SHOSTENKO, YU. V., S. KH. MUSHINSKAYA, E. D. CHERKASHINA, V. A. DANEL'YANTS, E. S. VYSOTSKAYA, N. G. BOZHKO, L. V. SKORKIN, and V. A. MISHCHENKO. 1968. Preparing a morphine base. (Rus). Izobret., Prom. Obraztsy, Tovarnye Znaki 45(9): 22.

The base is prepared by extracting uncut seedcases of opium poppies.

1669. SHULJGIN, G. 1969. Cultivation of the opium poppy and the oil poppy in the Soviet Union. Bull. Narc. 21(4): 1-8. LC: HV5800 B8.

Detailed account of cultivation in USSR including harvest of opium and seed. The cost of morphine obtained by extraction of the straw of the oil poppy is half of that obtained from opium.

1670. SIJBRING, P. H. 1963. Results of some storage experiments under controlled conditions (agricultural seeds). (Summ. Fr and Ger). Proc. Int. Seed Test. Assoc. 28(4): 845-851. 61.9 In84P.

Using silica gel to control relative humidity to 37%, poppy seeds survived for 16 months without loss of viability.

1671. SILVA, F. 1963. Distribution of morphine in the capsules of some poppy lines. (Ital; summ. Rus and Fr). Comun. Akad. Republ. Populare Romine 13(7): 639-644. 512 B8522C.

Morphine content in poppy capsules of individual plants decreased in order of their development, the oldest contained the highest amount.

1672. SILVA, F., E. PAUN, and E. MATEESCU. 1963. Dynamics of morphine accumulation in the poppy of mixed usage cultivated in various pedoclimatic zones of R.P.R. (Rum; summ. Rus and Fr). Comun. Acad. Republ. Populare Romine 13(1): 53-58. 512 B8522C.

Morphine content increased from the humid forested zone towards the dry steppe soils.

1673. SIMANEK, V., V. PREININGER, P. SEDMERA, and F. SANTAVY. 1970. Isolation and chemistry of the alkaloids from some plants of the genus Papaver. XLVIII. Studies in exhaustive methylation of tetrahydroprotoberberine alkaloids and the structure of the alkaloids PO-4, PO-5, orientalidine and mecambridine. Coll. Czech. Chem. Commun. 35(5): 1440-1455. 385 C68.

1674. SIMMONDS, P. L. 1895. Notes on some saps and secretions used in Pharmacy. Amer. J. Pharm. 67: 322-329. 396.8 Am3.

Production and exportation of opium in India and Persia and its utilization.

1675. SINGH, C. 1965. Poppy cultivation in Madhya Pradesh. Indian Farming 15(16): 24-25. 22 In283.

Information on soil preparation, sowing, irrigation, intercultivation, manuring, rotations and the extraction of opium.

1676. SINGH, C. 1969. Poppy cultivation for opium. World Crops 21: 270. 281.8 W892.

Notes on soil requirements, sowing, manuring, irrigation, weeding and extraction of opium in India.

1677. SINGH, U. P. and K. R. KHANNA. 1970. Male sterility in opium poppy, Papaver somniferum L. Sci. & Cult. 36: 554-556. SI: 505.54 S41.

In crosses between male-sterile plants (which arose spontaneously or following gamma radiation) and fertile forms, male-sterile forms were found in the F_1 and F_2. Meiosis was normal but the anthers were small and the pollen degenerated.

1678. SKORIC, V. 1930. Plant diseases at the University Farm 'Maksimir.' (Croat; summ. Eng). Reimpress. Extraits Rapp. Annu. Univ. Zagreb. 1929: 738-746. 33.38 Z1.

Peronsopora arborescens on Papaver somniferum in Yugoslavia.

1679. SKUHRAVY, V., and M. SKUHRAVA. 1962. Bionomics and distribution of the poppy-head gall-maker, Clinodiplosis papaveris Kjell. (Diptera, Itonididae). (Ger; summ. Czech). Ceskoslov. Spolecnost. Ent. Casopis 59(3): 221-233. 420 C33.

Includes host plants and development of insect.

1680. SKVORTZOW, B. W. 1921. Notes on the agriculture, botany and zoology of China. XXXIX. The poppy culture of North Manchuria. J. N. China Branch Roy. Asiatic Soc. 52: 79-82. SI: 506.51.

Until 1908 poppy was planted on 10% of the arable land of North Manchuria. Fields were camouflaged by planting hemp, maize and kaoliang around them or interplanting with maize. Methods of cultivation and harvest are given.

1681. SLAVIK, J. 1963. Alkaloids of the Papaveraceae. XXIII. Alkaloids of *Papaver dubium* L. and the structure of aporheine. (Ger; summ. Rus). Collect. Czech. Chem. Commun. 28: 1738-1746. 385 C68.

Aporheine, mecambrine, dubirheine and traces of coptisine were found.

1682. SLAVIK, J. 1964. Alkaloids of Papaveraceae. XXVI. Alkaloids from *Papaver dubium* ssp. *lecoqii* (Lamotte) Fedde and *P. dubium* ssp. *albiflorum* (Boiss.) Dost. (Ger; summ. Rus). Collect. Czech. Chem. Commun. 29(5): 1314-1318. 385 C68.

From subsp. *lecoqii* was isolated a base consisting of 75% berberine and very little coptisine and allocryptopine. The same compounds were found in subsp. *albiflorum* in a different ratio, berberine was less than 50%.

1683. SLAVIK, J. 1966. Alkaloids of Papaveraceae. XXXV. Conversion of (-)-mecabrine into (+)-roemerine (aporheine) and the composition of mecambridine. (Ger; summ. Rus). Collect. Czech. Chem. Commun. 31(10): 4184-4187. 385 C68.

1684. SLAVIK, J., and J. APPELT. 1965. Alkaloids of the Papaveraceae. XXIX. Alkaloids of some *Papaver* species. (Ger; summ. Rus). Collect. Czech. Chem. Commun. 30(11): 3687-3696. 385 C68.

Alkaloids from 11 species were investigated.

1685. SLAVIK, J., J. APPELT, and L. SLAVIKOVA. 1965. Alkaloids of the Papaveraceae. XXXI. Alkaloids of *Papaver commutatum* Fisch. & Mey. (Ger; summ. Rus). Collect. Czech. Chem. Commun. 30(11): 3961-3963. 385 C68.

Papaverine, rhoeagenine and 7 other alkaloids were isolated.

1686. SLAVIK, J., L. DOLEJS, K. VOKAC, and V. HANUS. 1965. The structure of alaucamine, an alkaloid from _Papaver_ _glaucum_ Boiss. et Hauskn. Mass spectrometric study of fragmentation of rhoeadine alkaloids. Collect. Czech. Chem. Commun. 30(8): 2864-2869. 385 C68.

1687. SMALL, L. F., and R. E. LUTZ. 1932. Chemistry of the opium alkaloids. U.S. Publ. Health Rep. Suppl. No. 103, U.S. Government Printing Office, Washington. 375 pp. 151.65 P965.

The many poppy alkaloids are treated separately.

1688. SMARODS, J. 1955. A survey of imperfect fungi of Latvia SSR. II. Melanconiales and III. Hyphomycetales. (Report 3). (Latv; summ. Rus). Izv. Akad. Nauk. Latvijsk SSR 8(97): 93-105. 511 R442.

Alternaria _brassicae_ var. _somnifera_, leaf spot on capsules of _P_. _somniferum_ in Latvia.

1689. SMITH, E., J. LEVINE, and D. BANES. 1968. Partition chromatographic assay of opium and opium preparations. J. Assoc. Off. Anal. Chem. 51(1): 180-185. 381 As7.

Quantitative recovery of spectrophotometrically pure morphine.

1690. SMOLENSKI, S., H. SILINIS, and N. R. FARNSWORTH. 1972. Alkaloid screening. I. Lloydia 35(1): 1-34. 442.8 L77.

Included among 1000 plants tested, _P_. _rhoeas_ showed a positive reaction.

1691. SNITZER-PASTERNAK, Y., and J. GALIL. 1970. Barriers contributing to the isolation of _Papaver_ spp. in Israel. Israel J. Bot. 19: 121-136. 450 Is7.

The 4 self-incompatible species studied were _P_. _humile_ subsp. _sharonense_, _P_. _syriacum_, _P_. _carmeli_, and _P_. _subpiriforme_. Distribution patterns of the parent species were formed through edaphic isolation which permitted survival of hybrids in marginal areas of mixed soils.

1692. SOKOLOV, U. S. 1952. Alkaloidonosnye rasteniya SSSR. (Alkaloid containing plants of the USSR). (Rus). Akad. Nauk. SSSR, Bot. Inst. im V. L. Komarava. 378 pp. 459.2 So3.

Alkaloids in _Papaver_ spp. given.

1693. SONOHARA, S., S. TAWADA, and T. AMANO. 1952. Flora of Okinawa. Ed. by E. H. Walker. U.S. Civil Administration of the Ryukyii Islands. 237 pp. SI: 581.95281 S69.

The Papaveraceae are given on pp. 58-59 and include P. rhoeas and P. somniferum.

1694. SOROA, J. M. DE. 1944. Medicinal plants: The poppy. (Span). Surco (Madrid) 3(32): 11-15. 15 Su7.

Notes on the cultivation of the opium poppy, including the harvest of opium, in Spain.

1695. *SOS, J. 1942. The economic and nutritional value of poppy seed. (Hung). Kiserl. Kozlem. 45: 97.

Because of nutritive and flavoring properties, poppy seed production should be substantially increased.

1696. SOSA, A., and C. SOSA-BOURDOUIL. 1966. On the flavonolosides of the flower of a white poppy (Papaver somniferum L. var. Mursellii). (Fr). Compt. Rend. Hebd. Seances Acad. Sci. 262(10): 1144-1146. 505 P21.

The petals yielded 2 substances identified as quercetol 3-glucoside and quercetol 3-gentiobioside.

1697. SOSA-BOURDOUIL, C. 1946. On the chemical activity of the stamens of poppy. Differences between fertile lines and sterile lines. (Fr). Compt. Rend. Hebd. Seances Acad. Sci. 223: 43-45. 505 P21.

Various genotypes differ as to certain enzymatic activity of stamen tissue. Stamens of non-fertile genotypes are relatively poor in phosphorus.

1698. SOSA-BOURDOUIL, C., P. LECAT, and A. SOSA. 1963. The inheritance of pigmentation in Papaver somniferum L. Compt. Rend. Hebd. Seances Acad. Sci. 256: 2683-2685. 505 P21.

Variety Mursellii (white flowered containing 2 flavonoid glucosides) x Flora III (petals with red base and 1 glucoside) resulted in an F_1 with a general violet color in the petals. F_2 showed regressions and intermediate types.

1699. SOSA-BOURDOUIL, C., and A. SOSA. 1967. Floral pigments of two varieties of _Papaver somniferum_ L. and their hybrids. (Fr; summ. Eng and Ger). Bull. Soc. Chim. Biol. 49(11): 1593-1608. 383 Sol.

White flowering _P. somniferum_ var. Mursellii which contains 2 flavonic glycosides in the petals was crossed with Flora III with pale violet lunule but almost no flavonolosides. From hybrid color and glycosides it appears that the introduction of the Mursellii variety influenced flavoloside synthesis and intensified anthocyanin synthesis.

1700. SOUEGES, R. 1926. Embryogeny of Papaveraceae. Development of the proembryo in _Papaver rhoeas_ L. (Fr). Compt. Rend. Hebd. Seances Acad. Sci. 183(20): 902-904. 505 P21.

Cytological study.

1701. SOUEGES, R. 1926. Embryogeny of Papaveraceae. Later stages of embryo development in _Papaver rhoeas_ L. (Fr). Compt. Rend. Hebd. Seances Acad. Sci. 183(23): 1119-1120. 505 P21.

Cytological study.

1702. SOUEGES, R. 1928. Development of the embryo of _Papaver rhoeas_. (Fr). Bull. Soc. Bot. France 75(5/6): 452-469. 451 F84B.

Cytological study of the development.

1703. SOUSA DA CAMARA, E. DE. 1930. Contributions to the mycoflora of Portugal. Anais Inst. Super. Agron. 3: 59-141. 105.7 L682.

Macrophoma papaveris produces leaf spots on _P. somniferum_.

1704. *SOWERBY, A. DEC. 1923. Opium and narcotics in China. China J. Sci. & Arts 1: 425-427.

Discussion of trade in opium and physiological effect of opium in China, by smoking, eating and injecting. India justifies sale of opium on grounds that is is eaten as a prophylactic against malaria.

1705. SPENNEMANN, ____. 1936. Results of experiments with the poppy varieties of the State Food Administration. (Ger). Mitt. Landw. 51: 101-102. 18 D48M.

Comparison of varieties for the years 1934 and 1935 for seed yield and oil in Germany.

1706. SPENNEMANN, ____. 1937. Results of experiments on poppy varieties, 1936. (Ger). Mitt. Landw. 52: 268. 18 D48M.

Yield of seed and the oil content of various varieties in Germany.

1707. SPRAGUE, T. A. 1922. Meristic variation in *Papaver dubium*. J. Bot. 60: 299-300. 450 J82.

A positive correlation was observed between the number of flowers per plant and the number of stigma-rays per flower. Poorly nourished plants have fewer and well nourished more rays than average.

1708. STADNIK, J., and V. KATETOV. 1939. Comparative trials with poppies, 1933-1937. (Czech). Zem. Arch. 30(1/2): 53-59. 19.5 Z45.

Comparative studies showed that yields were higher in Bohemia than in Moravia where they were reduced by pests. Grey varieties Dubsky and Freudluv contained the largest amounts of oil.

1709. STANDLEY, P. C. 1937. Flora of Costa Rica. Part 2. Field Mus. Nat. Hist., Bot. Ser. 18(392): 401-780. SI: QK217 S78.

Papaveraceae given (pp. 461-462) include *P. somniferum*.

1710. STANDLEY, P. C., and S. CALDERON. 1925. Lista preliminar plantas de El Salvador. San Salvador, El Salvador. 274 pp. SI: QK222 S78.

Papaveraceae (pp. 85-86) include *P. somniferum*.

1711. STANDLEY, P. C., and J. A. STEYERMARK. 1946. Flora of Guatemala. Fieldiana, Bot. 24(4): 1-493. SI: QK218 F632.

The Papaveraceae are given on pp. 347-354 and include *P. rhoeas* and *P. somniferum*.

1712. STANEV, M. Z. 1960. Poppy root weevils (*Stenocarus fuliginosus* Marsh. and *Ceuthorrhynchus denticulatus* Shrank.) in Bulgaria and their control. (Bulg; summ. Rus and Ger). Nauch. Trud. Tsent. Nauch. Inst. Zasht. 3: 151-188. 464.9 So2.

Biology and control.

1713. STANEV, ST., and D. ELENKOV. 1961. Extraction of some pharmaceutical raw materials from plants. II. Dynamics of the extraction of morphine from poppies. (Bulg; summ. Rus and Ger). God. Khim.-Tekhnol. Inst. 8(2): 117-125. LC: TP1 K485.

1714. STANEVICIENE, S. 1970. Germination of conidia of some species of Peronosporaceous fungi. (Rus; summ. Lith and Eng). Trudy Akad. Nauk Litovsk, SSR, Ser. V, 1(51): 25-28. 511 Ak193D.

Spores of _Peronospora arborescens_ studied.

1715. STANISLAS, E., G. ROUX, M. ROUZET, and J. CAZAUBON. 1956. The seed of _Meconopsis cambrica_ Vig. (Papaveraceae); anatomical studies and comparisons with the seed of _Papaver somniferum_ L. (Fr). Ann. Pharm. Franc. 14: 37-41. 396.8 An7.

The testa of _M. cambrica_ differs only from _P. somniferum_ by the absence of the second layer of the internal tegument.

1716. STAPEL, C. 1943. Industrial plants. (Dan). Plantesygd. Denmark 59: 42-43. 464.9 OV23.

Peronospora arborescens and _Helminthosporium papaveris_ caused severe attacks on poppy in 1943 in Denmark.

1717. STAPEL, C. 1960. Diseases and pests of poppies. (Dan). Landbonyt 14(9): 276-278. 11 L2322.

Popular notes on the occurrence in opium poppy in Denmark of boron and potassium deficiency, damping-off, _Peronospora arborescens_ and _Helminthosporium papaveris_, with indications for control.

1718. *STARKENSTEIN, E. 1924. Die Papaveraceen-alkaloids. (Ger). Handbuch der Experim. Pharmak. 2(2): 817-1085. Berlin.

1719. STARY, B. 1941. A new insect of poppy. (Czech; summ. Ger). Ochr. Rostl. 17: 88-90. 464.8 Oc3.

Flower buds and heads were injured by _Calocoris norvegicus_ in Bohemia.

1720. STATENS FORSOGSVIRKOMHED PLANTEKULTUR. 1959. Trials with varieties of opium poppy. (Dan). Medd. 615 Stat. Forogsvirk. Plantekult., Kbh. 2 pp. 11 D412M.

Seed and oil yield for 3 varieties, Mahndorfer, Aarslev Lund and Svalöf Flora in Denmark.

1721. STATENS FORSOGSVIRKSOMHED PLANTEKULTUR. 1960. Opium poppy variety trials 1948-1958. (Dan). Tidsskr. Planteavl 64(1): 161-162. 11 T439.

Comparison of 3 varieties in different areas of Denmark.

1722. STEENIS, C. G. G. J. VAN. (Ed). 1955-1958. Flora Malesiana, Ser. I, Vol. 5: 1-595. P. Noordhoff, Ltd.

The Papaveraceae are given on pp. 114-117 and include the cultivated ones, *P. nudicaule*, *P. rhoeas* and *P. somniferum*.

1723. STEFANOVIC, D., and V. ILIC-DJURDJIC. 1965. Determination of morphine in poppy straw. (Serb; summ. Eng). Arhiv. Fhrma. 15(4): 281-286. LC: RS1 A69.

It is not economical to extract morphine from the poppy straw remaining after the extraction of opium.

1724. STEHLIK, V. 1946. The combined cultivation of poppy and sugar beet. (Czech; summ. Eng and Rus). Sborn. Ceskoslov. Akad. Zemed. 19: 170-172. 19.5 C332C.

The yield of poppies depended on their proximity to the sugar beet, the density of growth of the beet and the number of poppies per area.

1725. STEHLIK, V. 1946. Combined cultivation of sugar beet and poppy and their development. (Experiment in 1942-1946). (Czech; summ. Eng and Rus). Sborn. Ceskoslov. Akad. Zemed. 19: 214-222. 19.5 C332C.

Detailed account of the combined cultivation from the viewpoint of the sugar beet grower. Poppies growing in close proximity to beets reduced the weight of leaves and root and the content of sugar. This wartime measure was not recommended.

1726. STEINBERG, J. 1947. The poppy, the oil fruit of the garden. (Ger). Gart.-Jahr. 2/3: 22-24. 80 G1932.

General article on cultivation including the soil, fertilizing, planting and harvest.

1727. STENZEL, E. 1960. Recommendations for the development of large area cultivations of Papaver somniferum L. for opium alkaloid production. (Ger). Pharmazie 15(1): 39. LC: RS1 P673.

Experimental work in Germany has shown that the cultivation of the opium poppy for opium would be practical there and in adjoining areas of Hungary and Czechoslovakia.

1728. STEPHANENKO, O. B., and F. M. SHEMYAKIN. 1970. Thin-layer chromatography of opium alkaloids performed on a buffered silica gel layer. (Rus; summ. Eng). Farmatsiya (Moscow) 19(1): 37-40. MAM.

Separation of morphine, codeine, thebaine, narcotine and papaverine.

1729. STERMITZ, F. R. 1968. Alkaloid chemistry and the systematics of Papaver and Argemone. Recent Advances Phytochem. 1: 161-183. QK865 A1R1.

Evaluations are made of the detailed alkaloid content of the 2 genera in respect to intrageneric relations. There is appreciable correlation between alkaloid content and morphology.

1730. STERMITZ, F. R., and H. RAPOPORT. 1961. O-Demethylation as a biosynthetic pattern in the formation of opium alkaloids. Nature 189: 310-311. 472 N21.

By root-feeding opium poppy plants with labeled morphine, codeine and thebaine and recovering the alkaloids later, evidence was obtained on the conversion of thebaine to codeine and of codeine to morphine with o-demethylation as a metabolic pathway.

1731. STERMITZ, F. R., and H. RAPOPORT. 1961. The biosynthesis of opium alkaloids. Alkaloid interconversions in Papaver somniferum and P. orientale. J. Amer. Chem. Soc. 83(19): 4045-4050. 381 Am33J.

Radioactive thebaine fed to P. somniferum is converted to codeine, then morphine. In P. orientale it appears to be converted to oripavine. Thebaine shows rapid synthesis and transformation with an important role in the plant's metabolism.

1732. STEUBING, L. 1955. Studies on competition between tree roots and field crops. The effect of oaks as hedgerow trees. (Ger; summ. Eng). Plant & Soil 7: 1-25. 450 P696.

The effects of oaks on soil conditions, microclimate, weed flora and plant growth are analysed for various crops including opium poppies.

1733. STEVENS, W. A. 1970. The effects of seed extracts on local lesion formation by tobacco necrosis virus. (Summ. Ger). Experientia 26(11): 1268-1269. 475 Ex7.

Extracts of *P. orientale* seed, among those tested, reduced the number of local lesions formed by tobacco necrosis virus on French bean leaves.

1734. STEVENSON, J. A. 1942. *Cercospora* on poppy in Alabama. Pl. Dis. Reporter 26(12/13): 280. 1.9 P69P.

First report of *C. papaveri* in the U.S.

1735. STEWARD, A. M. 1958. Manual of Vascular Plants of the Lower Yangtze Valley China. Oregon State College, Corvallis. 621 pp. SI: 581.951 S94.

The Papaveraceae are given on pp. 134-135 and include *P. somniferum* and *P. rhoeas*.

1736. STEYERMARK, J. A. 1963. Flora of Missouri. Iowa State University Press, Ames, Iowa. 1725 pp. 455.74 St4F.

The Papaveraceae are given on pp. 719-723 and include *P. somniferum*, *P. dubium* and *P. rhoeas*.

1737. STRANSKY, K., and M. STREIBL. 1969. Natural waxes. XII. Composition of hydrocarbons in morphologically different plant parts. Coll. Czech. Chem. Commun. 34(1): 103-117. 385 C68.

In a number of plants including *P. rhoeas* and *P. somniferum* it was shown that distribution of alkanes and alkenes varied considerably in different parts of the plant. This finding must be taken into account in chemotaxonomic studies on whole plants.

1738. STRAUSS, D. 1968. Foodstuffs affected by noxious organisms: I. Parasite attacks on legumes, Gramineae and other food stuffs. (Ger; summ. Eng and Fr). Deutsch Lebensmittel Rundsch. 64(4): 113-116. 389.8 D482.

Troctes divinatorius on moldy poppy seed cake.

1739. STRONA, I. G. 1966. Seeds of annual field crops. (Rus). Izdatel'stvo "kolos", Moscow. 464 pp. SB117 S75.

Characteristics of agricultural seeds in general are emphasized. Chapter 2 includes a description of poppy seeds.

1740. STUCKI, W. 1932. Uber eine neue Methode zur Bestimmung des Morphins im Opium. (Diss.) Zurich. 80 pp. 387.1 St95.

Comparison of a number of methods.

1741. SUBBOTINA, N. V. 1961. Effect of wilting on transformation of carbohydrates. (Rus; summ. Eng). Fiziol. Rast. 8(3): 279-283. 450 F58.

Wilting increased soluble sugar and decreased carbohydrates in poppy leaves.

1742. SÜDI, J., and G. MATOLOCSY. 1962. Colchicine-like action of plants of some amide derivatives of 3,5-dichlorophenoxyacetic acids. Bot. Gaz. 123: 265-272. 450 B652.

N-butyl-3,5-dichlorophenoxyacetamide caused a weak response in opium poppy.

1743. SUGAWARA, T. 1942. Effect of chemical growth substance on the bending of flower stalks in *Papaver*. Proc. Imp. Acad. Japan 18: 89-96. LC: 513 T576.

Application of growth substances to the peduncle of *P. rhoeas* or *P. somniferum* causes the normal upright peduncle to bend at the site of application due to the enlargement of parenchyma cells and the formation of meristematic tissue.

1744. SUGIURA, T. 1940. Chromosome studies on Papaveraceae with special reference to the phylogeny. Cytologia 10: 558-576. 442.9 C99.

Chromosome numbers are given for some genera, including *Papaver*, which is the most highly developed genus in the family.

1745. SULTZBERGER, H. H. 1884. All about opium. 110, Cannon St., E. C., London. 207 pp. 77 Su5.

A group of articles by various authors dealing with many aspects of opium production and use in various parts of the world.

1746. SURUGUE, P. G. 1963. Some views on the problems of oil plants in Morocco. (Fr; summ. Arab, Eng and Span). Al Awamia 6: 135-156. 24 Awl.

Production of the poppy in Morocco should be increased.

1747. SUSZKO, J., R. WALA, and W. Z. ANTKOWIAK. 1968. Nonalkaloid components of Papaver rhoeas. (Pol; summ. Eng and Rus). Rocz. Chem. 42(11): 1887-1891. 385 R59.

Chromatographic separation of the non-alkaloid wax components.

1748. SVENDSEN, A. B. 1948. The colorimetric determination of morphine in opium. (Dan). Dansk. Tidsskr. Farm. 22(6): 131-160. 396.8 D23.

Several methods are compared and a new one is proposed.

1749. SVENDSEN, A. B., and T. KOLBOE. 1963. Determination of morphine in poppy capsules. (Ger). Meddel. Norsk Farm. Selskap 25(8): 117-123. Univ. of Texas Libr., Austin.

Chemical separation by chromatography on Al_2O_3.

1750. SVESHNIKOVA, I. N. 1955. Fat formation in plastids. (Rus). Dokl. Akad. Nauk SSSR 102(5): 1039-1941. 511 P444A.

Microscopic analysis of the leucoplasts and chloroplasts formed in the seeds of a number of oil plants including poppy, confirmed the conversion of starch grains into fat.

1751. SVESHNIKOVA, I. N. 1956. Formation of fats in starch grains and plastids. Research 9(10): 396-402. 472 R31.

A special method of staining made it possible to demonstrate that in maturing seeds of oil plants (including P. somniferum) starch in starch grains is gradually converted to fat.

1752. SWARBRICK, J. T., and J. C. RAYMOND. 1970. The identification of the seeds of the British Papaveraceae. Ann. Bot. (London) 34: 1115-1120. 450 An7.

The morphology of seeds of British wild, introduced and commonly cultivated Papaveraceae were studied and a key to the identification of the seeds is given. Of the 10 Papaver species, P. somniferum and P. orientale are included.

1753. SYDOW, E. 1949. Why don't we raise more poppies? (Ger). Land, Wald & Gart. 4: 69-70. 18 L22.

Poppies should be grown more since their seed contains more protein and starch than rape seed.

1754. SYDOW, H., P. SYDOW, and E. J. BUTLER. 1907. Fungi of East India. (Eng, Ger and Lat). Ann. Mycol. 5: 485-515. 450 Sy2.

Peronospora arborescens collected on leaves of Papaver somniferum. (p. 512).

1755. SZABO, S., P. GORECKI, and R. BOGNAR. 1968. The companion alkaloids of morphine. IV. Occurrence and semiquantitative determination of narcotoline, cryptopine, papaverine and narceine in the separate phases of Kabay process for morphine production. (Ger). Pharmazie 23(12): 719-724. LC: RS1 P673.

1756. *SZEGI, J., J. RAUSCH, K. MAGDA, H. H. WOLF, and L. D. CLARK. 1959. Relationship between the chemical structure and pharmacological activity of opium alkaloids. Acta Physiol. Acad. Sci. Hung. 16(4): 325-335.

Study of the analgesic potency, toxicity and depressive effect on respiration of 16 morphine derivatives.

1757. SZELENYI, G. VON. 1938. Pests of poppy cultivated for oil in Hungary. (Ger). Verh. 7. Int. Kongr. Ent. Berlin 4: 2625-2639. 422 C76.

The following pests for oil poppy in Hungary are discussed: Otiorrhynchus ligustici L., Stenocarus fuliginosus Marsh., Ceutorhynchus denticulatus Schrk., C. macula-alba Hbst., Doralis fabae Scop., Agriotes sputator L., Baratha brassicae L., Adelphocoris lineolatus Goeze, Dasyneura papaveris Winn., Timaspis papaveris Kieff.

1758. SZILAGYI, E. 1968. Influence on soybean trypsin inhibitors on germination and growth of plants. (Hung; summ. Eng). Acta Biol. Debrecina 6: 157-169. 510 D35.

Trypsin inhibitor had little effect on the germination but inhibited root growth in *P. somniferum* and other plants. Free amino acids increased in treated roots so protein synthesis was inhibited.

1759. SZWADIAK, J., and M. MICHNA. 1959. Nitrogen fertilization effect on seed yield, fat and albumen content in seeds and morphine content in the poppyheads of the poppy variety KM. (Pol; summ. Rus and Eng). Hodowla Rosl. 3(2): 229-235. 64.8 H66.

High N produces a lower fat content but it is compensated by an increased seed yield so the total fat content is higher.

1760. TABOR, E. 1970. Plant poisons in Shakespeare. Econ. Bot. 24(1): 81-94. 450 Ec7.

Drinking poppy syrup, eating the seeds or applying poppy oil to the temples induced sleep.

1761. TACKHOLM, V. 1956. Student's Flora of Egypt. Anglo-Egyptian Bookshop, Cairo. 649 pp. SI: 581.962 L38.

The Papaveraceae are given on pp. 369-376 and include 8 species of *Papaver*.

1762. TAHARA, M. 1915. The chromosomes of *Papaver*. (Jap). Bot. Mag. (Tokyo) 29: 254-257. 450 B651.

Studies of *P. rhoeas*, *P. orientale* and *P. somniferum* var. *glabrum*.

1763. TAI, F. L. 1936. A list of fungi hitherto known from China. Sci. Rep. Natl. Tsing Hua Univ., Ser. B, Biol. Sci. 12: 137-165. 513 P35.

Downy mildew, *Peronospora arborescens* on *Papaver somniferum* in China.

1764. TAIRA, H., and H. TAIRA. 1964. Amino acid composition of seeds and nuts. (Jap; summ. Eng). Eiyo To Shokuryo 17(4): 244-247. 389.9 J27.

Eighteen amino acids were determined by microbiological analysis in seeds including *P. somniferum*.

1765. TAKEMOTO, T., and Y. KONDO. 1964. A ketoic acid from the seeds of _Papaver somniferum_ L. (Jap; summ. Eng). J. Pharm. Soc. Japan 84(5): 474-477. 396.9 P49.

Identified as 11-oxotriacontanoic acid.

1766. TAKIMOTO, S. 1935. A soft rot of opium poppy. (Jap; summ. Eng). Kyushu Imp. Univ. Fakul. Terkult., Bull. Sci. 6(4): 306-311. 107.6 K995B.

Bacterium papaveris n. sp., pathogenic to _P. somniferum_, _P. rhoeas_ and _P. orientale_.

1767. *TANAKA, K., and S. KAKUMA. 1967. Growth substances contained in the flower buds and peduncles of _Papaver rhoeas_. Sci. Rep. Hirosaki Univ. 14(1/2): 37-44.

A growth substance found in the milky liquid exuding from the vascular region of the cut surface of peduncles or ovary walls is believed to be an auxin precursor.

1768. TANAKA, T. 1920. New Japanese fungi. Notes and translations. IX. Mycologia 12: 329-333. 450 M99.

Helminthosporium papaveris on _P. somniferum_ in Taiwan and Japan.

1769. TARASKENKO, M. T. 1959. Precipitation of morphine with sodium tetraphenylborate. (Rus). Sborn. Nauch Rabot Moskov Farm. Inst. 1958(2): 46-54. RS1 M6A2.

1770. TATEMATSU, A., and T. GOTO. 1965. Analysis of mixed drugs by mass spectrometry. I. Analysis of opium alkaloids. (1) Mass spectra of opium alkaloids and the allied compounds. (Jap; summ. Eng). J. Pharm. Soc. Japan 85(2): 152-157. 396.9 P49.

Compared with the usual analytical methods, mass spectrometry is capable of analysis of minute amounts, takes only 10-20 min., needs no pretreatment, has high reproducibility and is not affected by diluents and preservatives.

1771. TATEMATSU, A., and T. GOTO. 1965. Analysis of mixed drugs by mass spectrometry. IV. Analysis of opium alkaloids. (2). Influence of ionizing potential on the mass spectra of codeine, dihydrocodeine and papaverine. (Jap; summ. Eng). J. Pharm. Soc. Japan 85(9): 778-785. 396.9 P49.

1772. TATEMATSU, A., and T. GOTO. 1965. Analysis of mixed drugs by mass spectrometry. V. Analysis of opium alkaloids. (3). Assay of codeine phosphate and dihydrocodeine. (Jap; summ. Eng). J. Pharm. Soc. Japan 85(9): 786-790. 396.9 P49.

1773. TATEMATSU, A., T. GOTO, T. NAKAMURA, and S. YAMAGUCHI. 1966. Analysis of mixed drugs by mass spectrometry. VI. Analysis of opium alkaloids. (4). The salts of codeine. (Jap; summ. Eng). J. Pharm. Soc. Japan 86(3): 195-199. 396.9 P49.

1774. TATNALL, R. R. 1946. Flora of Delaware and the Eastern Shore. Society of Natural History of Delaware. 313 pp. 455.22 T182.

The Papaveraceae are given on pp. 126-128 and include _P_. _somniferum_ and _P_. _dubium_.

1775. TAUBENECK, U. 1954. Research with microorganisms antibiotic to _Helminthosporium_ _papaveris_. (Ger). Nachr.-Blatt Deutsch. Pflanzenschutzd. n.s. 8: 56-57. 464.9 N11.

Streptomycetes soil antibiotic to _H_. _papaveris_.

1776. TAYLOR, F. C. 1929. Opium alkaloids. pp. 655-758. _In_ A. H. Allen, Allen's commercial organic analysis. 5th Ed. P. Blakiston's Son & Co., Philadelphia. 387 AL5C.

Comprehensive discussion of the chemistry of the opium alkaloids.

1777. TAYLOR, N. 1963. The abyss of divine enjoyment: The story of opium, morphine and heroin, pp. 29-52. _In_ N. Taylor, Narcotics: Nature's dangerous gifts. Dell Publishing Co., New York. LC: QT 3010 T38.

A history of opium usage and traffic including its effect on writers and literature.

1778. TEIJGELER, C. A. 1962. Determination of morphine in opium. (Dutch). Pharm. Weekblad 97: 69-81. 396.8 P4922.

1779. TETENYI, P. 1966. The situation and the principal processes of medical plant improvement. (Fr; summ. Hung). Herba Hung. 5(2/3): 100-111. 71.8 H413.

Interspecific crossing of _P_. _orientale_ x _P_. _somniferum_ and the alkaloids of the progeny is given. There are tables of other medicinal plants.

1780. TETENYI, P. 1970. Infraspecific chemical taxa of medicinal plants. Chemical Publishing Co., New York. 225 pp. QK99 T38.

On pp. 184-186 the species of Papaveraceae are listed with the alkaloids known to occur in them.

1781. TETENYI, P., and D. FÖLDESI. 1970. Experiments with unthinned poppy cultures grown from irradiated seed mixtures. Acta Agron. Acad. Sci. Hung. 19(1/2): 147-160. 19 Ac8.

A mixture of irradiated and untreated poppy seed sown at 2 kg/0.57 ha germinated simultaneously but seedlings of irradiated seeds died in 2-3 weeks saving the labor of thinning.

1782. *TETENYI, P., and G. LORINCZ. 1965. Infraspecific chemical taxa of the poppy. (Hung; summ. Eng and Rus). Kiserl. Kozlem., Sect. C. 57(2): 75-93.

Main alkaloids in samples of poppy varieties are morphine, codeine, thebaine and papaverine. Observations revealed no definite relationships between morphological features and alkaloid content, although the races could be morphologically characterized.

1783. TETENYI, P., G. LORINCZ, and E. SZABO. 1961. Investigation of infraspecific chemical differences in the opium poppy. Characterization of hybrids of *Papaver somniferum* L. x *Papaver orientale* L. (Ger). Pharmazie 16(8): 426-433. LC: RS1 P673.

In the F_1 generation the main alkaloid in 75% of the plants was morphine, in 15% codeine, in 7% thebaine and in 3% papaverine. Morphine was always present, but occasionally one of the other alkaloids was absent.

1784. TETENYI, P., and D. VAGUJFALVI. 1965. Changes in the alkaloid content of *Papaver somniferum* L. II. (Ger). Pharmazie 20: 731-734. LC: RS1 P673.

The occurrence and proportion of the different alkaloid groups in several strains of poppy is genetically controlled and the content of individual alkaloids within a type is greatly affected by weather. Differentiation of alkaloids takes place 18-26 days after germination.

1785. TETENYI, P., and D. VAGUJFALVI. 1967. The taxonomic significance of poppy alkaloids. (Hung; summ. Ger and Rus). Herba Hung. 6(2): 123-141. 71.8 H413.

The chemical taxa of the poppy were characterized in connection with the alkaloid content. Relationships of other species to the Papaveraceae are discussed.

1786. TETENYI, P., and D. VAGUJFALVI. 1968. Taxonomic importance of the alkaloids of the poppy. (Fr). Pl. Med. Phytother. 2(2): 97-107. MAM: WI PL109.

The chemotaxonomic importance of alkaloids in the poppy is discussed. The presence and the proportion of the 3 main groups, phthalylisoquinolines, morphinanes and benzylisoquinolines, are shown to be more significant than those of individual alkaloids and are more important than morphological characters.

1787. TEWARI, S. N. 1967. New paper chromatographic separation of microquantities of opium alkaloids. (Summ. Ger and Fr). Mikrochim. Acta 4: 704-707. 384 M58.

A technique using salt-buffered papers for separating alkaloids.

1788. THOMAS, H. 1923. Poppy cultivation and opium yield in Germany. (Ger). Ber. Deutsch. Pharm. Ges. 33: 25-30. 396.9 D48.

1789. THOME, O. W. 1886-1934. Flora von Deutschland, Osterreich und der Schweiz. II. Gera-Untermhaus. 241 pp. SI: QK314 T46.

The Papaveraceae are given on pp. 128-131 and include *P. rhoeas*, *P. dubium*, *P. somniferum* and *P. argemone*; the latter 2 have colored plates.

1790. THOMPSON, P. A., and G. E. BROWN. 1972. The seed unit at the Royal Botanic Gardens, Kew. Kew Bull. 26(3): 445-456. 451 K51B.

P. spicatum germinates best between 16° and 26° C; *P. glaucum*, between 6° and 16° C.

1791. THORNTON, J., and D. J. DILLON. 1966. Identification of the opium poppy. Forensic Sci. Soc. J. 6: 42-43. LC: Law Period.

A simple method requiring one hour for the extraction and identification of the principal poppy alkaloids by chromatography.

1792. THURESON-KLEIN, A. 1967. Ultrastructural features of the *Papaver somniferum* seedling. J. Miss. Acad. Sci. 13: 84-85. 500 M697.

Description of the cell ultrastructure.

1793. THURESON-KLEIN, A. 1970. Observations on the development and fine structure of the articulated laticifers on *Papaver somniferum*. Ann. Bot. 34: 751-759. 450 An7.

Laticifers are not present in the embryos but differentiate soon after germination and are found in the phloem areas 18-30 hours after the seed is sown.

1794. TIDESTROM, I. 1941. A Flora of Arizona and New Mexico. Washington, D.C. 897 pp. 455.81 T43.

The Papaveraceae are given on pp. 41-44 and include *P. somniferum* and *P. nudicaule radicatum*.

1795. TOCHINAI, Y., and I. HARA. 1944. A list of parasitic fungi collected in the Territory of Mo-Kyo, the inner Mongolia, in the summer of 1942. J. Sapporo Soc. Agric. 36(3): 91-97. 22.5 Sa6.

Peronsopora arborescens was collected on *Papaver somniferum*.

1796. TODOROV, K. 1947. Importance of poppy culture in Bulgaria. (Bulg). Bulgaria Glav. Dir. Khranosnabdiavaneto. Spis. 11(3/4): 7-15. 59.9 B87.

Cultivation of poppy.

1797. TOLF, R. 1891. Mycological notes from Smaland. I. (Swed). Bot. Not. 1891: 211-221. 450 B656.

Peronsopora arborescens collected on *Papaver somniferum* in Sweden.

1798. TOLMACHEV, A. (TOLMATCHEW, TOLMATCHEV). 1923. On the European races of *Papaver radicatum* Rottb. (Rus). Bot. Mater. Gerb. Blavn. Bot. Sada RSFSR 11/12: 1-10. 451 Sa22.

Description of 4 new subspecies.

1799. TOLMACHEV, A. 1927. Forms of *Papaver radicatum* Rottb. and their distribution in Scandinavia. (Ger). Svensk. Bot. Tidskr. 21(1): 73-83. 450 Sv2.

Two new subspecies are described.

1800. TOLMACHEV, A. 1930. *Papaver nudicaule* L. and a few related Asiatic *Papaver* forms. (Ger). Svensk. Bot. Tidskr. 24: 33-43. 450 Sv2.

The morphology, distribution and relationships of several Asian species including several new species.

1801. TOLMACHEV, A. 1953. On the problems in the theory of species formation. (Rus). Bot. Zhurn. 38: 530-555. 451 R923.

Several Papaver spp. sect. Scapiflora are used as examples.

1802. TOMKO, J. 1950. Opium alkaloids in Slovak poppies. (Czech). Chem. Zvest. 4: 475-478.

The various alkaloids from opium, especially cryptopine are described.

1803. TRAUTNER, E. M. 1946. A small-scale assay of poppy heads and hay. J. & Proc. Austral. Chem. Inst. 13(7): 255-268. 385 Au72.

A method for analysis of 5 g heads or 20 g hay which gives results comparable to large scale assay.

1804. TRENEL, M. 1950. A contribution towards an authoritative evaluation of the effect of lowering the water table on yields in loess soils. (Ger). Z. Pflanzen. Dung. 49: 224-237. 384 Z343A.

Variations obtained in lengths of poppy roots are explained by the physical properties of the soils.

1805. TROJANEK, J., F. KAVKA, J. VIT, and Z. CEKAN. 1964. Extracting opium alkaloids. (Czech). Czech. Patent 110,847: 1-6. U.S. Patent Office.

From crushed poppy heads.

1806. TROJANEK, J., F. KAVKA, J. VIT, and Z. CEKAN. 1965. Isolation of morphine from poppy capsules. I. Investigations on the extraction of morphine from opium poppy capsules. (Ger). Pharmazie 20(3): 172-175. LC: RS1 P673.

1807. TRUE, R. H., and W. W. STOCKBERGER. 1916. Physiological observations on alkaloids, latex and oxidases in Papaver somniferum. Amer. J. Bot. 3(1): 1-11. 450 Am36.

Oxidase activity is most active in the upper part of the plant and parallels the distribution of the latex which in itself is most active.

1808. TSCHEPOURKOVSKY, E. 1942. An experimental biometrical study on the inheritance of the number of rays in Papaver somniferum. Proc. Sixth Pacific Sci. Congr. 4: 737-738. 330.9 P194.

The number of rays as influenced by the conditions of growth of a plant will not serve as a character for distinguishing subvarieties.

1809. TUCHOLKA, Z., and K. KUZMINSKA. 1966. Changes of nitrogen and fat content in opium poppy depending on nitrogen fertilization and period of harvest. (Pol; summ. Eng). Prace Komis. Nauk Roln. Lesn. PTPN 20(2): 381-394. 20.5 P872.

The N and fat content in mature seeds seemed directly proportional to N in the medium, whether as $Ca(NO_3)_2$ or $(NH_4)_2SO_4$, but the $Ca(NO_3)_2$ yielded more stem, leaf, capsule and seed.

1810. TULECKI, J., and P. GORECKI. 1969. Extraction of minor alkaloids of poppy seeds from an industrial "morphine effluent." (Pol; summ. Ger). Ann. Pharm. (Poznan) 7: 25-29. LC: RS1 P78.

Narcotoline, narcotine and papaverine were isolated.

1811. TURALA, K. 1969. Giant chromosomes in plants. (Pol). Wiad. Bot. 13(1): 33-42. Cornell Univ. Libr.

Giant chromosomes have been found in endopolyploid nuclei of the embryo sac of P. rhoeas.

1812. TUTAYUK, V. K. 1961. Papaver orientale L. in the Istisu Mountains. (Rus; summ. Azerb). Akad. Nauk. Azerb. SSR. Dok. 17(6): 511-514. 511 Ak147D.

Ecology and morphology of a wild P. orientale found at an elevation of 2300-2600 m.

1813. TWARI, S. N., and B. O. TANEJA. 1966. Studies on the smoking of narcotic drug-opium. Pharmazie 21(11): 699-700. LC: RS1 P673.

The smoke from various samples of opium contained rich quantities of morphine, codeine, thebaine, narcotine and papaverine.

1814. TYLER, V. E. 1966. The physiological properties and chemical constituents of some habit forming plants. Lloydia 29(4): 275-292. 442.8 L77.

'Chicalote opium,' a hybrid between opium poppy and Argemone mexicana, is reportedly used like opium, and is habit forming. Leaves of Mitragyna speciosa, chewed when fresh or smoked when dried, are used as a habit drug in Thailand, but have also been used as an opium cure and opium substitute.

1815. UBRIZSY, G., and J. VÖRÖS. 1966. Phytopathogenic and saprophytic fungi from Hungary. I. Contributions to the Peronosporales, Erysiphales and Deuteromycetes flora of Hungary. Acta Phytopathol. Acad. Sci. Hung. 1(1): 145-163. SB731 A3.

Erysiphe communis and Peronospora arborescens common on poppies in Hungary.

1816. UENO, N., E. TAKEMURA, and K. HAYSAHI. 1969. Additional data for the paper chromatographic survey of anthocyanins in the flora of Japan. IV. Studies on Anthocyanins, LXI. Bot. Mag. (Tokyo) 82: 155-161. 450 B651.

The petals of P. rhoeas contain 2 hexosides.

1817. UGAI, F., and S. YAMAGUCHI. 1961. On the derivatives of saccharin salt of the main alkaloids in opium. (Jap; summ. Eng). J. Pharm. Soc. Japan 81(1): 151-152. 396.9 P49.

The alkaloid saccharin salts formed have a sweet taste, the sweetness of the saccharin shielding the bitterness of the base.

1818. UKRAINETS, V. 1964. Production of poppy oil in Ukraine. Tekh. Sel'sk. Khoz. 24(12): 16-18. 58.8 M11.

A new method for using machinery in the field rather than by hand. Data on man days needed for producing oil in the field.

1819. UKRAINETS, V. 1966. After-harvest processing of oil poppy seeds. (Rus). Tekh. Sel'sk. Khoz. 26(8): 20-22. 58.8 M11.

Large-scale processing.

1820. UKRAINETS, V. 1967. Mechanical cultivation of poppy. (Rus). Tekh. Sel'sk. Khoz. 27(1): 14-16. 58.8 M11.

Poppy is more difficult to cultivate than other crops. Cultivation, not harvest or sowing, takes 80% of the time. Depending on level of mechanization, 1 ha. needs 20-92 man days of work.

1821. UNITED NATIONS. 1949. Opium production throughout the world. Bull. Narc. 1(1): 6-13, 26-38. LC: HV5800 B8.

A general survey of production in individual countries.

1822. UNITED NATIONS. 1950. The cultivation of the opium poppy in Turkey. Bull. Narc. 2(1): 13-25. LC: HV5800 B8.

An extensive article on the varieties of P. somniferum, classification according to capsule and seed color, cultivation of plants, harvest and yield of opium and the properties of Turkish opium.

1823. UNITED NATIONS. 1952. New narcotic drugs and their international control. Bull. Narc. 4(1): 1-5. LC: HV5800 B8.

Methods are given for international control of the production and trade of new drugs.

1824. UNITED NATIONS. 1956. Legal trade in narcotics in 1954. Bull. Narc. 8(1): 33-35. LC: HV5800 B8.

Statistics on drug production in the world in 1953 and 1954.

1825. UNITED NATIONS. 1961. The South-East Asia Consultative Group on Narcotics Control. Bull. Narc. 13(4): 37-38. LC: HV5800 B8.

Opium production is legal in the Shan state of Burma and is part of the social fabric of tribes in northern Laos and similar areas. The indigenous production is difficult to abolish so the agricultural economy of the tribes must first be improved.

1826. UNITED NATIONS, DEPT. OF SOCIAL AFFAIRS. 1949. Determining the origins of opium. Bull. Narc. 1: 14-19 and 42-47. LC: HV5800 B8.

The most useful methods for origin determination are microscopic examination, colorimetric determination of porphyroxine-meconidine, codeine determination and morphine determination; lesser characteristics of importance are fats, oils, narcotine, thebaine, papaverine and ash.

1827. UNITED NATIONS, DEPT. OF SOCIAL AFFAIRS. 1950. The suppression of poppy cultivation in the United States. Bull. Narc. 2(3): 9-21. LC: HV5800 B8.

Commercial cultivation of poppies is being suppressed to control narcotic addiction. If in time of crisis it became necessary for the U.S. to produce its own opiates, 13,000-22,000 acres would be necessary.

1828. UNITED NATIONS INTERNATIONAL NARCOTICS CONTROL BOARD. 1970. Statistics on narcotic drugs for 1968 and maximum levels of opium stocks. 80 pp. LC: HV5801 15.

Statistics on production, manufacture, international trade and consumption as well as seizures in the illicit traffic.

1829. UNITED NATIONS INTERNATIONAL NARCOTICS CONTROL BOARD. 1971. Second supplement to the statement of estimated world requirements of narcotic drugs and estimates of world production of opium in 1971. 41 pp. LC: HV5801 I522.

Statistics by country of the estimated amount of different drugs needed for medicinal and scientific purposes.

1830. UNITED NATIONS SECRETARIAT. 1941. The determination of morphine in opium by extraction. U.N. Secretariat document ST/SOA/SERJK/1. pp. 2-20.

A new method is discussed.

1831. UNITED NATIONS SURVEY TEAM (Phillips, J. F. V., W. R. Geddes and F. T. Merrill). 1969. The opium-producing hill tribes of northern Thailand. Bull. Narc. 21(1): 1-29. LC: HV5800 B8.

Recommendations for short and long term cash crops as a substitute for poppy cultivation.

1832. UNITED STATES BUREAU OF NARCOTICS. 1927-1928. Report by the government of the United States of America for the fiscal year ended June 30, 1928, on the traffic in opium and other dangerous drugs. 40 pp. Washington, D.C. 151.621 T67.

This detailed paper gives the effect of new regulations on the importation and exportation of drugs, a review of seizures of drugs made during the preceeding year and a listing of the quantity of drugs imported by other countries from the U.S. as medicine.

1833. UNITED STATES DEPARTMENT OF AGRICULTURE. 1871. The opium poppy. Agricultural Report 1870: 206-210. 1 Ag84.

Data from a few small plots of opium poppy planted in New York, Kansas, Vermont and California gave a high enough yield to encourage cultivation in the U.S.

1834. UNITED STATES DEPARTMENT OF AGRICULTURE. CROPS RESEARCH DIVISION. 1970. Index of plant diseases in the United States. Agriculture Handbook 165. U.S. Government Printing Office, Washington. 531 pp.

Plant pests of importance in the United States to Papaver are listed on p. 329.

1835. UNITED STATES SENATE, COMMITTEE ON FOREIGN RELATIONS. 1954. International opium protocol. Report of the Committee on Foreign Relations, 83rd Congress, 2nd Session. Executive Report No. 7. Government Printing Office, Washington, D.C. 93 pp. 286.371 Un3.

Protocol to curb illicit cultivation, production and sale of opium by reducing the world production from 2,000 tons/year to 500 tons/year. A system of national and international controls is to be adopted.

1836. UNITED PROVINCES OF AGRA AND OUDH. 1921. Report on the operations of the opium department for the year ending 31st October, 1920. Government Press, United Provinces, Allahabad, India. 17 pp. 71.39 In2.

The appendices give complete tables on the amount of opium produced in the various areas, expenditure, land under cultivation, price received, medical opium manufactured, prosecutions under the opium laws, etc.

1837. UNK, J. 1966. Tasks in poppy production. (Hung). Magyar Mezogazd. 21(15): 5-6. 19 M27.

1838. UPPAL, B. N., M. K. PATEL, and M. N. KAMAT. 1935. The fungi of Bombay. Bull. Dept. Agric. Bombay 176: 1-56. 22 B63B.

Rhizoctonia solani, damping-off in *P. somniferum* in India.

1839. URMINSKY, K. 1966. Importance of the culture of poppy. (Czech). Za Vysolou Urodu 14(10): 375-376. 64.8 Z12.

As a drug plant.

1840. VAGUJFALVI, D. 1966. Uptake of alkaloids by the laticiferous vessels and their transport in the latex. (Ger; summ. Eng). Z. Pflanzenphysiol. 55(4): 322-326. 450 Z32.

Investigation with 8 species, including *P. somniferum*, showed that alkaloids taken up by plant leaves and roots appeared also in the latex and were transported in the laticiferous vessels.

1841. VAGUJFALVI, D. 1970. Studies on the localization of alkaloids in some Papaveraceae taxa. (Hung; summ. Ger). Bot. Kozlem. 57(2): 113-120. 450 N85.

P. somniferum, *P. orientale*, *P. somniferum* x *P. orientale* and *Chelidonium majus* were studied.

1842. VAGUJFALVI, D., and P. TETENYI. 1967. Biosynthesis of the poppy alkaloids. (Hung; summ. Ger and Rus). Herba Hung. 6(2): 221-230. 71.8 H413.

The biosynthesis of morphine alkaloids is described with a discussion of their taxonomic significance.

1843. VAGUJFALVI, D., P. TETENYI, and G. LŐRINCZ. 1966. Infraspecific chemical relation and alkaloid formation during ontogeny in Papaver somniferum L. (Ger). Abh. Deutsch. Akad. Wiss. Berlin, Kl. Chem. 3: 349-353. 509 D482.

A study of self-pollinated strains showed that alkaloid content and composition are hereditary and verifies the existence of infraspecific varieties. The presence and ratio of morphinan and benzlisoquinoline compounds is more important than relative or absolute percentage of alkaloid components.

1844. VAJIC, B., and F. MIKIC. 1951. The water and morphine content in Yugoslav opium. (Serb). Srzska Akad. Nauka. Odeljenje prirodno-Math. Nauka. Posebna Izdanja, No. 4. 161 pp. 387.1 W21.

1845. VAN DOBBEN, W. H. 1957. The photoperiodically responsive stage for rye, wheat, poppies, vetches and flax. (Dutch). Jaarb. Inst. Biol. Scheik. Onderz. 1957: 57-64. 60.9 W123.

Poppies show little reaction to daylength when only the coleoptiles are developed.

1846. VAN DOBBEN, W. H. 1959. Some observations on the nitrogen uptake of spring wheat and poppies in relation to growth. (Dutch; summ. Eng). Meded. Inst. Biol. Onderz. Landbouwege. 85: 93-105. 60.7 W123V.

In pot experiments of P. somniferum, fresh weight and N intake were linearly correlated until N became limiting. Dry weight continued to increase due to carbohydrate accumulation. Top dressing increased the size of the leaves and gave a 4-fold increase in yield of tops.

1847. VAN DOBBEN, W. H. 1961. Nitrogen uptake of spring wheat and poppies in relation to growth and development. (Dutch; summ. Eng). Jaarb. Inst. Biol. Scheik. Onderz. 154: 45-60. 60.9 W123.

In poppy var. Emmabloem, N deficiency appearing before stem elongation increased dry matter content, whereas N deficiency appearing during elongation decreased their dry matter content.

1848. VANEK, V. 1968. The oriental poppy. (Czech). Zahradn. Listy 61(6): 182. 80 Ov64.

Cultivation, including cultivars.

1849. VAN ETTEN, C. H., F. R. EARLE, T. A. MCGUIRE, and F. R. SENTI. 1956. Ion exchange separation of morphine prior to its determination in Papaver somniferum. Analytical Chem. 28(5): 867-870. 381 J825A.

1850. VAN-NGHIEP, ____. 1967. Soybeans replace opium. Joint. Publ. Res. Serv. Trans. N. Vietnam 257: 80-81. DS557 AuJ6.

Opium was a main crop in the Lao Cai area and there was much addiction. After 1966 opium was abandoned and soybeans were planted.

1851. VAN POETEREN, N. 1923. Report on the activities of the Phytopathological Service in the year 1922. (Dutch). Wageningen Plantenziektenkund. Dienst, Verslag, en Meded. 31: 1-59. 464.9 W122.

Peronospora arborescens caused a severe attack of false mildew on blue-bird-seed poppy in the Netherlands in 1922. (pp. 25-26).

1852. VAN POETEREN, N. 1929. Report on the activities of the Phytopathological Service in the year 1927. (Dutch). Wageningen Plantenziektenkund. Dienst, Verslag, en Meded. 55: 1-93. 464.9 W122.

P. somniferum attacked by Dendryphium pencillatum producing black spots on stalks and midribs of leaves. (p. 17).

1853. VAN POETEREN, N. 1933. Report on the activities of the Phytopathological Service in the year 1932. (Dutch). Wageningen Plantenziektenkund. Dienst, Verslag, en Meded. 72: 1-148. 464.9 W122.

Dendryphium pencillatum attacked 85% of P. somniferum in Oudenbosch Dist., Netherlands in 1932. (pp. 25-26).

1854. VAN ROON, E. 1956. Poppy-seed trials, 1955. (Dutch). Meded. Centr. Inst. Landbouwk. Onderz. 2: 1-66. 108.2 W123R.

Trials with 3 varieties of poppy increased yield by cultural methods. In the variety 'Emmabloem,' growing as few plants per unit area as possible resulted in larger seed which had greater export value. Adulteration by the bitter-tasting seed of Erysimum cheiranthoides reduced the value of Netherlands-grown poppy seed.

1855. VAN ROON, E. 1957. Poppy research in 1956. (Dutch). Proefst. Akker- Weidebouw, Wageningen Meded. 7: 1-24. 64.9 W122.

Comparison studies of different varieties grown in different parts of the Netherlands.

1856. VAN ROON, E. 1958. Poppy research in 1957. (Dutch). Proefst. Akker- Weidebouw, Wageningen Meded. 9: 1-25. 64.9 W122.

In nitrogen poor soils, split applications of N, the second a week before flowering, produced 10-15% more seed. For ease in sowing, mix poppy with seed of Medicago lupulina; thinning is eliminated. Optimum row spacing was 20 cm with 10 plants per meter row.

1857. VAN ROON, E. 1959. The application of divided nitrogen dressings to some seed crops. (Dutch; summ. Eng). Proefst. Akker. Weidebouw Publ. 6. 131 pp. 12 W12.

Highest seed yields were obtained where 1/3 of the N was applied at sowing and 2/3 as a top dressing, 3-7 days before flowering of the poppy.

1858. VAN ROON, E. 1962. Nitrogen fertilization of seed crops. Stikstof (Eng edition) 6: 59-64. 57.9 St52Ae.

Poppy is often fertilized too heavily. Split applications, the second 19 days before flowering, increases production.

1859. VAN WISSELINGH, C. 1919. Contributions to a knowledge of seedcoats. Third contribution: On the seedcoats of the Papaveraceae and Fumariaceae. (Dutch). Pharm. Weekblad 56: 849-865. 396.8 P4922.

In seeds of 9 species including _P. somniferum_ and _P. rhoeas_ that were studied, the innermost integument and nucellus are separated by a cuticle which starts at the embryo and becomes further developed as the seed ripens.

1860. VASKOVSKY, P. 1965. On the question of costs and returns of growing poppy in Slovakia. (Czech). Pol'nohospodarstvo 11(9): 715-721. 19.5 P752.

Economics of growing poppies.

1861. VAUGHAN, J. G. 1970. The structure and utilization of oil seeds. Chapman and Hall Ltd., London. 279 pp. SB298 V3.

P. somniferum and _Argemone mexicana_ are described on pp. 195-199 giving macroscopic and microscopic details of structure and utilization.

1862. VERESHCHAGIN, A. G. 1962. Triglyceride composition of poppy seed oil. (Rus; summ. Eng). Biokhimiya 27(5): 866-874. 385 B523.

1863. VERNIE, F., J. LHOSTE, and A. CASANOVA. 1966. Trial results with picloram for weed control in winter wheat. (Fr; summ. Eng and Ger). Weed Res. 6(4): 322-331. 79.8 W412.

Fumaria officinalis and _Papaver_ sp. were resistant to picloram.

1864. VESSELOVSKAYA, M. A. 1933. The poppy, its classification and its importance as an oleiferous crop. (Rus; summ. Eng). Trudy Prikl. Bot. Gen. 56: 1-213. 77 V63.

An extensive monograph of _P. somniferum_ comprising history and spread of culture, variability of characters, ecological-geographical differentiation of the species and its classification.

1865. VIALA, A., F. GOUEZO, and J. CATALIN. 1969. Application of thin-layer chromatography to the analysis of illegal heroin samples from different geographical origins. (Fr). Med. Leg. Domm. Corp. 2(1): 21-26. MAM.

The presence of acetylocodeine in heroin is a sign of clandestine synthetic origin.

1866. VICHERKOVA, M., and F. PLHAK. 1966. Study on the autopathic and allelopathic properties of crop plants using the following-crop method. (Ger; summ. Czech and Rus). Biol. Pl. 8(6): 456-469. 450 B52.

Growth of sugar beet grown in pots of soil from which poppy had been harvested was considerably inhibited, and the inhibition became greater the longer the poppy plants had been allowed to grow.

1867. VIDIC, E. 1957. A new reagent for distinguishing between morphine derivatives. (Ger). Arch. Toxicol. 16: 412-418. FDA.

The reagent is 2,4-dinitrophenylhydrasine in trichloroacetic acid.

1868. VIGNOLI, L., J. GUILLOT, F. GOUEZO, and J. CATALIN. 1966. Separation of opium alkaloids and their acetylated derivatives by thin-layer chromatography. II. Application to samples of illegal morphine and heroin. (Fr). Ann. Pharm. Fr. 24(7-8): 529-532. 396.8 An7.

Proportions of the various alkaloid components indicated the stages of treatment of the crude materials.

1869. VIGUIER, L. G. A. 1814. Histoire naturelle, medicale et economique, des pavots et des argemones. Montpellier. 50 pp. 396 V68.

Part I includes history, general information of species and genera, uses by people and medical information. Part II is a shortened taxonomic treatment.

1870. VILCINS, M., and K. ABELE. 1927. On the development of pollen and embryosac of Papaver rhoeas L. Acta Horti. Bot. Univ. Latviensis 2(2/3): 125-132. 451 L35.

Embryological study.

1871. VILLADA, M. M. 1893. Remarks on the indigenous plants of the family of the Papaveraceae. (Span). Gac. Med. Mexico 29: 164-174. LC: R21 G2.

European opium poppy planted on an experimental basis yielded 10-15% morphine in Mexico.

1872. VILMORIN, H. DE. 1900. On some hybrid poppies. J. Roy. Hort. Soc. 24: 203-204. 84 L84J.

Early hybrids of *P. bracteatum* x *P. somniferum* with descriptions of the F_1, F_2 and backcrosses.

1873. VOLOTOV, E. N. 1941. Polyploids in *Papaver somniferum* L. induced by treatment with colchicine. Compt. Rend. (Dokl.) Acad. Sci. URSS 31(3): 261-263. 511 P444.

The tetraploids formed had thick stems and leaves, large flowers, a large flattened capsule and their vegetative period lasted 6-8 days longer. Fertility was sufficient for cultivating opium poppies but not for oil poppies.

1874. VON SZELENYI, G. 1935. Some observations on the life history of the poppy weevil. (*Ceutorrhynchus macula-alba* Hrbst.). (Hung; summ. Eng). Rep. Hung. Agr. Exp. Sta. 38(5-6): 217-224. 105.9 H89.

1875. VOROZHTSOV, N. N., and A. T. TROSHCHENKO. 1935. The morphine content in the latex of opium poppies. (Rus; summ. Ger). Compt. Rend. (Dokl.) Acad. Sci. USSR 1935(2): 555-558. 511 P444.

Opium contains 11.6% morphine; 18.4% of the morphine of the latex is lost by fermentation.

1876. VOSKERUSA, J. 1960. Investigations on the morphine content of poppy capsules. (Ger). Pharmazie 15: 552-558. LC: RS1 P673.

Morphine content was influenced by environmental and genetical factors, the highest amount in the Czech variety Dubsky stribrosedy.

1877. VOSKERUSA, J. 1961. A contribution to the study of morphine content in ripe dry poppy seed pods (*Papaver somniferum* L.). (Rus; summ. Eng). Za Sotsial. Sel'skokhoz, Nauk 10(2): 143-150. 64.8 Z1.

Morphine content is genetically controlled but is affected by ecological conditions. Southern European varieties with high morphine have a very low content when sown in northern regions.

1878. VOSKERUSA, J. 1964. On the nutrition of poppy (Papaver somniferum L.) with regard to the morphine content in ripe poppy heads and to the importance of boron. (Czech; summ. Rus and Eng). Rostl. Vyroba 10(7): 709-720. 64.9 C33.

In field tests, small doses of boron (5 kg borax/ha) were effective in increasing poppy seed yield if complete N, P, K fertilization was applied. Fertilizers did not affect the morphine content of dry ripe poppy capsules.

1879. VOSKERUSA, J. 1966. Harvesting the poppy. (Czech). Za Vysokou Urodu 14(10): 376-377. 64.8 Z12.

Harvesting equipment.

1880. VOSKERUSA, J. 1967. Interaction between various technical factors affecting yield and quality in poppy cultivation consistent with a maximum reduction of hand labor. (Ger; summ. Eng). Z. Acker-Pflanzenbau 126(3): 257-276. 18 J825.

Poppies planted in widely spaced rows (30-40 cm) and transversely hoed gave yields equivalent to crops which were thinned by hand. Morphine content was largely determined by ecological factors.

1881. VOSS, W. 1887. Data on the mycology of Krains. V. (Ger). Verh. Zool.-Bot. Ges. Wien 37: 207-252. 410.9 V67.

Entyloma fuscum on leaves of opium poppy.

1882. VOSTRIKOVA, A. I. 1951. On the pollination of oil poppy. (Rus). Agrobiologiia 3: 143-146. 20 Ag822.

Seeds were produced by 3 combinations of pollination: pollen from the same flower, pollen from different flowers on the same plant and pollen from different plants. Self-pollination does not occur naturally.

1883. VUILLEMIN, P. 1907. Number of petals and frequency of the three petal type in Papaver bracteatum. (Fr). Bull. Soc. Bot. France 54: 511-517. 451 F84B.

Petal number ranges from 2-6 with 4 the most common (literature cites 3) and stigma number 11-19 with 15 the most common. Petal maculation is correlated with petal number.

1884. VUILLEMIN, P. 1923. Variation and fluctuation in the number of stigmas of Papaver. (Fr). Compt. Rend. Hebd. Seances Acad. Sci. 177: 444-445. 505 P21.

Healthy plants of P. orientale had more stigmas than poor-growing plants. Addition of nitrogen to the soil increased the number of stigmas in P. somniferum.

1885. WAGENINGEN, RIJKS-INSTITUUT VOOR RASSENONDERZOEK VAN LANDBOUWGEWASSEN. 1947. No. 31: Poppy seed, 1947. (Dutch). Maandbl. Landbouwvoorld. 4: 367-368. 12 N383M.

Productivity of 4 varieties of P. somniferum grown in the western and northern clay lands of the Netherlands.

1886. WAGENINGEN, INSTITUT VOOR RASSENONDERZOEK VAN LANDBOUWGEWASSEN. 1952. Blue poppy seed, 1952. (Dutch). Ber. Over Rassenkeuze 118: 1-2. 64.9 W12.

In The Netherlands poppy seed production is confined to the western clay regions. Trials for 4 recommended varieties are given.

1887. WAGENINGEN, INSTITUT VOOR RASSENONDERZOEK VAN LANDBOUWGEWASSEN. 1953. Blue poppy seed, 1953. (Dutch). Ber. Over Rassenkeuze 138: 1-2. 64.9 W12.

Seed production trials of 5 varieties in The Netherlands.

1888. WAGENINGEN INSTITUT VOOR RASSENONDERZOEK VAN LANDBOUWGEWASSEN. 1955. Blue poppy seed, 1955. (Dutch). Ber. Over Rassenkeuze 181: 1. 64.9 W12.

Comparative trials with poppy varieties Emmabloem, Nobel, Noordster and Eckendorfer carried out in two regions of The Netherlands.

1889. WAGENINGEN, INSTITUT VOOR RASSENONDERZOEK VAN LANDBOUWGEWASSEN. 1956. Blue poppy seed, 1956. (Dutch). Ber. Over Rassenkeuze 198: 1. 64.9 W12.

Trials of 4 varieties.

1890. WAGENINGEN, INSTITUT VOOR RASSENONDERZOEK VAN LANDBOUWGEWASSEN. 1958. Blue poppy seed, 1958. (Dutch). Ber. Over Rassenkeuze 242: 1. 64.9 W12.

Yield comparisons of 3 varieties.

1891. WAGENINGEN, INSTITUT VOOR RASSENONDERZOEK VAN LANBOUWGEWASSEN. 1959. Blue poppy seed, 1959. (Dutch). Ber. Over Rassenkeuze 260: 1. 64.9 W12.

Yield comparisons of 3 varieties.

1892. WAINSTEIN, P. 1951. Trials for morphine yield of poppy (*Papaver somniferum* var. *nigrum*). (Span). Revista Fac. Ci. Agrar. Univ. Nac. Cuyo. 3(2): 37-38. 102.5 M52.

The morphine content of dry capsules was 2.2% in both mature and slightly immature capsules from July-sown plants and capsule yield was 1,700 kg/ha. The figures for immature capsules from August-sown plants were 3.3% and 900 kg.

1893. WAINSTEIN, P. 1953. Suitability of the medicinal poppy in Mendoza Province. (Span). Idia 65: 10-11. 9 Id3.

The yield of morphine in Argentina shows great variation from year to year and season to season which is attributed to the weather.

1894. WALT, S. J. VAN DER, and D. G. STEYN. 1946. Recent investigations into the toxicity of plants, etc., No. XV. Onderstepoort J. Vet. Sci. Anim. Ind. 21(1): 45-55. 41.8 On1.

Among a large number of plants tested for toxicity to animals, *P. aculeatum* was non-toxic.

1895. WALTEROVA, D., and F. SANTAVY. 1968. Contribution to the structure of the red products of papaverrubine. (Ger). Coll. Czech. Chem. Commun. 33: 1623-1625. 385 C68.

1896. WARNE, L. G. G. 1941. The oil poppy. Gard. Chron. 110: 229-230. 80 G162.

Trial planting of a 10 m row of *P. somniferum* in Manchester, England gave a low yield due to excessive rain.

1897. WARREN, C. P. W. 1970. Some aspects of medicine in the Greek Bronze Age. Med. Hist. 14(4): 364-377. MAM.

In early Egypt poppies were often painted in frescoes but all the poppies found in excavations were species other than *P. somniferum* and it has been concluded that opium was unknown to them. Because there is evidence of the exchange of medical knowledge between Egypt and Bronze Age Greece (2800-1100 B.C.) it is unlikely that the Greeks used opium.

1898. WARTMANN-HAFNER, F. 1966. Thin-layer chromatographic identification of alkaloid-containing extracts and tinctures (proposals for the Swiss Pharmacopeia VI). (Ger; summ. Fr and Eng). Pharm. Acta Helv. 41(7): 406-427. 396.8 P4933.

Thin-layer chromatography was evaluated as an analytical tool to identify alkaloids in pharmaceutical preparations including opium extracts.

1899. WATERSTON, J. M. 1939. Annotated list of diseases of cultivated plants in Bermuda. Bull. Dept. Agric. Bermuda 18: 1-33. 464 W31.

Entyloma fuscum on *P. somniferum* and *P. rhoeas*.

1900. WATT, H. E. 1923. Note on a sample of opium from the growth of 1852-1853. Pharm. J. 110: 241-242. 396.8 P49.

The sample of Candeish opium probably came from the Indian Museum and on analysis yielded 7.6% morphine.

1901. WATT, J. M. 1967. African plants potentially useful in mental health. Lloydia 30: 1-22. 442.8 L77.

P. aculeatum may be narcotic. Alkaloids are present but not morphine.

1902. WEESE, J. 1925. Selected Eumycetes exsiccati. Issue 9, No. 201-225. (Ger). Mitt. Bot. Inst. TH. Wien 2(1): 17-26. 451 V67.

Pleospora calvescens on stems of *Papaver somniferum* in Czechoslovakia.

1903. WEGNER, E. 1950. Photometric determination of poppy alkaloids. Determination of codeine, thebaine and narcotine in pure solutions. (Ger). Pharmazie 5(1): 33-35. LC: RS1 P673.

The described method gives good results with pure solutions but may be affected by impurities from plant materials.

1904. WEGNER, E. 1950. Photometric determination of poppy alkaloids. 2. Fluorimetric determination of papaverine. (Ger). Pharmazie 5(9): 445-447. LC: RS1 P673.

A quantitative fluorimetric method for determination of papaverine.

1905. WEGNER, E. 1951. Contribution to the gravimetric determination of morphine in poppy capsules. (Ger). Deut. Apoth. Zeitg. 91(23): 419-420. 396.8 Su2.

1906. WEGNER, E. 1953. Comparative investigations on the distribution of morphine in the vegetative organs of topped and normal poppy plants. (Ger). Pharmazie 8: 839-845. LC: RS1 P673.

The increase in dry weight of the topped and untopped plants was approximately the same over a 2 week period but there was less morphine in the topped plants.

1907. WEILL, P. B. 1950. The structure of morphine. Bull. Narc. 2(2): 8-20. LC: HV5800 B8.

The chemistry of morphine, its derivatives and synthetic analgesics.

1908. WEIMARCK, H. 1963. Skånes flora. (Swed). Bokförlaget Corona AB., Lund. 720 pp. SI: QK327 W42.

Papaveraceae are given on pp. 313-316 and include *P. dubium*, *P. argemone*, *P. rhoeas* and *P. somniferum*.

1909. WEISS, H. 1943. Careful harvesting of poppy. (Ger). Landesbauernschaft Wurttemb. Wohnbl. 110: 417. 18 W96.

Harvesting, drying and threshing of poppies.

1910. WEST, Q. M. 1972. Grain and livestock can replace poppies in Turkey's farm income. Foreign Agric. 10(4): 2-3, 12. A286.9 Ag8.

The 1972 poppy crop is to be the last one harvested in Turkey. Wheat, feedgrains, oilseed crops and livestock will be substituted.

1911. WESTERMARCK, N. 1945. The production of vegetable oils as an economic factor in Finland. (Fin; summ. Eng). Acta. Agr. Fenn. 58: 1-121. 20 Su7.

The oil plants tested, including poppy, produce more fat per ha than do other sources of fat production. Also man-labor requirements and production costs are lower than for animal fat.

1912. WESTERMEYER, J. 1971. Use of alcohol and opium by the Meo of Laos. Amer. J. Psychiat. 127(8): 1019-1023. VA.

Alcohol is used by the Meo within rigid social constraints and alcoholism does not occur. Opium, a cash crop, is found in every home; many smoke it but, even among chronic users, few become addicted.

1913. WESTON, T. A. 1930. A poppy which needs curbing. Horticulture (Boston) 8(23): 554. 80 H787.

P. orientale var. Olympia is a double flowered clone of uncertain origin whose relationship to the oriental poppy is doubtful.

1914. WETTSTEIN, W. 1937. Selection of an early ripening food poppy. (Ger). Züchter 9(11): 284-286. 442.8 Z8.

Varieties compared for early maturity, oil content and yield.

1915. WILDEMAN, E. DE. 1946. Variability in number of stigmas in *Papaver rhoeas* L. (Fr). Bull. Acad. Roy. Sci. Bruxelles 31(10/11): 459-470. 504 B83B.

Variation of the number of stigmas on a single plant as well as within the species are given. The author concludes that *P. rhoeas* is a composite species undergoing evolution and made up of a series of hybrids which are not stable.

1916. WILLAMAN, J. J., and H.-L. LI. 1970. Alkaloid-bearing plants and their contained alkaloids, 1957-1968. Lloydia 33(3A): 1-286. 442.8 L77.

In this compilation are listed 56 species and varieties of *Papaver* with their contained alkaloids and references.

1917. WINGE, Ö. 1932. Experiments with *Papaver rhoeas* L., f. *strigosum* Boenn. Acad. Sci. USSR Bull. Lab. Genet. 9: 115-120. 442.9 P44.

Forma *strigosum* with appressed hairs of the peduncle is dominant to the form with spreading hairs; however, the recessive is the more common form in nature.

1918. WINKLER, W., and W. AWE. 1961. Alkaloids of *Papaver rhoeas*. VIII. Structure of a rhoeadine isomer from *Papaver rhoeas*. (Ger). Arch. Pharm. 294(5): 301-306. 396.8 Ar2A.

Named isorhoeadine.

1919. WINTER, G. 1887. Ascomycetes. (Ger). *In* Rabenhorst's Kryptogamen-Flora 2: 1-928. 461 R11.

Pleospora papaveracea on dead poppy stems in North Italy and Hungary. (p. 501).

1920. WINTERRINGER, G. S. 1946. Notes on *Papaver dubium* and *Camassia angusta*. Rhodora 66: 16-17. 450 R34.

Records of *P. dubium*, a European poppy, in Illinois.

1921. WOKER, G. 1956. Die Chemie der Naturlichen Alkaloide mit besonderer Berucksichtigung ihrer Biogenese. (The chemistry of natural alkaloids, with special regard to their biogenesis). Vol. II. Ferdinand Enke Verlag, Stuttgart. 449-742 pp. 387 W83.

General chemical discussion of the biosynthesis of papaverine and other opium alkaloids.

1922. WOLD, J. K., and B. SMESTAD. 1970. The water-soluble polysaccharide of opium poppy (_Papaver_ _somniferum_ L.). Identification of acidic oligosaccharides from a partial acid hydrolysate. Acta Chem. Scand. 24(7): 2472-2478. 385 Ac82.

Six sugars were isolated.

1923. WOLD, J. K., B. SMESTAD, R. WINSNES, and D. RESSER. 1970. The water-soluble polysaccharide of opium poppy (_Papaver_ _somniferum_ L.). Acta Chem. Scand. 24(4): 1262-1270. 385 Ac82.

Sugars were isolated and identified.

1924. WONG, Y. C. 1919. Opium in China. Amer. J. Pharm. 91(12): 776-784. 396.8 Am3.

An interesting account of the history of the drug in China, particularly the rapid spread of opium smoking and the later efforts at suppressing it.

1925. WOODRUFFE-PEACOCK, E. A. 1913. Poppy hybrids. J. Bot. 51: 48-50. 450 J82.

Natural hybridization of British species.

1926. WORSDELL, W. C. 1930. Hybrid poppies. Gard. Chron. 88: 2292. 80 G162.

A brief historical account of hybrid poppies is given, including _P_. _ashfordense_, a spontaneous hybrid of _P_. _somniferum_ and _P_. _rhoeas_, which was seen in 1929 in a garden in Kent, England.

1927. WREDE, F. 1937. Narcotine, a new alkaloid of poppy (_Papaver_ _somniferum_). (Ger). Archiv Exper. Path. Pharm. 184: 331-335. 448.8 Ar2.

1928. *WREDE, F. 1938. A new poppy alkaloid. (Ger). Forschung. Fortschr. 14: 173.

Narcotoline occurs in the growing plant and in the dried capsules.

1929. WRIGHT, A. D. 1961. The history of opium. Trans. Stud. Coll. Physicians Philadel. 29: 22-27. R15 P5.

A review including the history of opium, the culture and harvest of poppies and the effect of opium on literature and art.

1930. WRIGHT, A. E. 1954. Opium in Pakistan. Bull. Narc. 6: 11-15. LC: HV5800 B8.

Problems in controlling opium trade after India and Pakistan were divided, including details of early crop failures.

1931. WRIGHT, J. O. 1967. Greenfinches and poppy seedheads. J. Roy. Hort. Soc. 92(1): 37. 84 L84J.

Greenfinches peck holes in the base of poppy capsules before they open.

1932. WÜEST, H. M., and J. FREY. 1936. Opiates from poppy straw. (Ger). Festschrift Emil C. Barell 1936: 556-570. LC: RS41 F4.

Morphine is unequally distributed in the dry plant; capsules contain up to 9%. The Roche process permits industrial production.

1933. YAROSLAVTSEVA, N. F. 1939. The effect of climatic conditions on growth of poppies grown for opium. (Rus). Dokl. Vsesojuzn. Akad. Sel'skohoz. Nauk Lenina 1939(23/24): 18-20. 20 AK1.

In southern Russia early poppies ripened 10 days before late ones and yields of opium and seed were higher.

1934. YASUI, K. 1921. On the behavior of chromosomes in the meiotic phase of some artificially raised _Papaver_ hybrids. Bot. Mag. (Tokyo) 35: 154-167. 450 B651.

Irregular behavior of chromosomes in hybrids between _P. orientale_ and _P. somniferum_.

1935. YASUI, K. 1927. Further studies on genetics and cytology of artificially raised interspecific hybrids of _Papaver_. Bot. Mag. (Tokyo) 41: 235-261. 450 B651.

F_1 of _P. somniferum_ var. _glabrum_ x _P. nudicaule_ resembled the male parent in the orange petal color, hairness, single flowers but resembled the female in being an annual. F_2, F_3 and backcrosses were made and the chromosome patterns were studied.

1936. YASUI, K. 1931. Cytological studies in artificially raised interspecific hybrids of *Papaver*. III. Unusual cases of cytokinesis in pollen mother-cells in an F_1 plant. Cytologia 2(4): 402-419. 442.8 C99.

Pollen mother-cells of an artificially raised F_1 plant of *P. somniferum* x *P. orientale* showed peculiar behavior during meiosis and pollen tetrad formation. Irregularities of the middle lamella formation, incomplete nuclear divisions and abnormal cleavage furrows were observed.

1937. YASUI, K. 1936. Cytogenetic studies in artificially raised interspecific hybrids of *Papaver*. IV. Interspecific hybrids of *P. orientale* L. and *P. bracteata* Lindl. Cytologia 7: 535-543. 442.8 C99.

Detailed chromosome analysis of the hybrids.

1938. YASUI, K. 1937. Cytogenetic studies in artificially raised interspecific hybrids of *Papaver*. VI. The trigenomic hybrids of *Papaver*. Cytologia, Fujii Jubilee Vol.: 1101-1112. 442.8 C99.

The F_1 of *P. somniferum* x a supposed natural hybrid between *P. orientale* and *P. bracteatum* resembles the male parent. Chromosome irregularities were observed.

1939. YASUI, K. 1937. Cytogenetic studies in artificially raised interspecific hybrids of *Papaver*. VII. *P. somniferum* L. x *P. bracteata* Lindl. Cytologia 8(2): 331-342. 442.8 C99.

Although F_1 plants appeared intermediate in characters, some characters of *P. somniferum* which are recessive in F_1 plants of *P. somniferum* x *P. orientale* are dominant in the cross of this study. Irregular chromosome behavior in the meiotic phases are discussed.

1940. YASUI, K. 1940. Cytogenetic studies in artificially raised interspecific hybrids of *Papaver*. IX. On the bivalents-association in the meiosis of the PMC of *Papaver somniferum*. Cytologia 10: 551-557. 442.8 C99.

The possible chromosomal relationships to explain the amphitriploidy of *P. somniferum*.

1941. YASUI, K. 1941. Cytogenetic studies in artificially raised interspecific hybrids of *Papaver*. VIII. F_1 plants of *P. bracteata* x *P. lateritum*. Cytologia 11(3): 452-463. 442.8 C99.

In the F_1 plants many characters of the male parent dominated. Also, variation in the chromosome size was greater than the parent.

1942. YASUI, K. 1943. Cytogenetic studies in the artificially raised interspecific hybrids of Papaver. X. On the chromosome behaviors in the PMCs of a triploid F_1 plant between Papaver No. 41,8 and P. bracteata. Cytologia 13: 126-138. 442.8 C99.

No. 41,8 is either an F_1 plant of P. orientale x P. bracteata or a derivative from such a hybrid. A detailed chromosome analysis is given for a cross of No. 41,8 x P. bracteata.

1943. YEH, S.-Y., and J. L. LACH. 1961. Stability of morphine in aqueous solution II. Separation of morphine from its degradation products. J. Pharm. Sci. 50(1): 30-34. 396.8 J825.

A modified procedure which removes the higher oxidation products before the morphine is isolated. Decomposition of morphine is very complex.

1944. YEH, S.-Y., and J. L. LACH. 1961. Stability of morphine in aqueous solution III. Kinetics of morphine degradation in aqueous solution. J. Pharm. Sci. 50(1): 35-42. 396.8 J825.

Degradation is dependent on the pH and the presence of oxygen.

1945. YOSHIMURA, H., K. OGURI, and H. TSUKAMOTO. 1968. The synthesis of codeine and morphine glucuronides. Tetrahedron Lett. 1968(4): 483-486. 385 T29.

1946. YOSSIFOVITCH, M. 1928. Kingdom of the Serbs, Croats and Slovenes: A destructive disease of the poppy in southern Serbia. Int. Bull. Pl. Protect. 2(2): 210-211. 464.8 In8.

Peronospora arborescens on Papaver somniferum in Yugoslavia.

1947. YOSSIFOVITCH, M. 1929. Peronospora arborescens (Berk.) de Bary, a very important parasite of Papaver somniferum in Yugoslavia. (Fr). Rev. Pathol. Veg. Entomol. Agric. France 16: 235-270. 464.9 Sol.

Seedlings may be infected from the moment of germination and all aerial parts are equally susceptible.

1948. YOSSIFOVITCH, M. 1930. Peronospora arborescens (Berk.) de Bary, a grave parasite of Papaver somniferum. (Fr). Compt. Rend. Seances Acad. Agric. France 15(29): 1010-1013. 14 P215Bc.

In Yugoslavia.

1949. YUFA, B., and V. SABASI. 1968. Oil poppy harvesting equipment. (Rus). Tekh. Sel'skom. Khoz. 8: 19-21. 58.8 M11.

Large scale machinery for harvesting the seeds.

1950. YUNUSOV, S. Y., V. A. MNATSAKANYAN, and S. T. AKRAMOV. 1961. Alkaloids from *Papaver fugax* Poir. Isoroemerine. (Rus). Dokl. Akad. Nauk Uzbeksk. SSR 8: 43-46. 511 U21.

Fungapavine, isoroemerine and several other unidentified bases were isolated.

1951. YUNUSOV, S. Y., V. A. MNATSAKANYAN, and S. T. AKRAMOV. 1965. Alkaloids of some species of *Papaver* and *Roemeria* and the structure of fugapavine. (Rus). Izv. Akad. Nauk SSSR, Ser. Khim. 3: 502-509. 511 Sa2C.

Twelve species of *Papaver* and *Roemeria* in the southeastern USSR contain up to 0.65% total alkaloids.

1952. ZAETS', V. O. (ZAYETS', V. A.). 1965. Development of the male and female gametophytes in *Papaver somniferum* L. and *Eschscholtzia californica* Cham. (Ukr; summ. Rus and Eng). Ukrajins'k. Bot. Zhurn. 22(1): 54-59. 450 J8212J.

The two species have similar development.

1953. ZAHN, H. 1966. Trials on the use of herbicides in poppies. (Ger; summ. Hung). Herba Hung. 5(2/3): 190-193. 71.8 H413.

A number of herbicides tried including 2,4-D, MCPA, MCPB, simazine, and prometryne, all showed some injury.

1954. ZAITSEVA, A. A. 1951. On the latex of the opium poppy. (Rus). Agrobiologiia 3: 122-126. 20 Ag822.

The development of the latex tubes in *P. somniferum* ceases before maturity and occasionally will disappear early (as in *Bocconia*, *Glaucium* and *Eschscholtzia*) but this has no influence on the growth and development of the plant.

1955. ZAITSEVA, A. A. 1959. The regular feature of morphine accumulation in the opium poppy (*Papaver somniferum* L.). (Rus; summ. Eng). Bot. Zhurn. (Moscow) 44(11): 1567-1677. 451 R923.

Alkaloids are not synthesized in the laticiferous tubes but are collected in them from the surrounding active tissue.

1956. ZAKHAROV, A. M., and K. I. BORYAEV. 1966. The search for flavonoid-producing plants in the flora of some regions of Kirghizia and Kazakhstan. (Rus). Rast. Resur. 2(1): 14-26. 450 R18.

A number of Papaveraceae were studied including *P. croceum* and *P. pavoninum*.

1957. ZAMAN, M. B., and S. M. IMAM. 1960. Morphine content of opium poppy plants under cultivation. Proc. Pan Indian Ocean Sci. Congr., Sect. D. pp. 387-388. 330.9 P192.

The problems of cultivation of poppies in Pakistan is discussed. The maximum yield of opium was found in the middle period of collection having a morphine content of 10-12%.

1958. ZAMAN, M. B., and A. S. KHAN. 1969. Studies on some diseases of *Papaver somniferum* Linn. Pakistan J. Forest. 19(2): 185-193. 99.8 P17.

In West Pakistan, root rot, stem rot and damping-off are caused by *Rhizoctonia solani*, powdery mildew by *Erysiphe polygoni* and leaf spots by *Cercospora papaveri*.

1959. ZAMBETTAKIS, C. 1952. Research on the helminthosporosis of the opium poppy and its control. (Fr). France Inst. Natl. Rech. Agron., Ser. C., Ann. Epiphyt. 3: 11-59. 464.9 F8.

A biological study of *Helminthosporium papaveri*.

1960. ZANDA, G. B. 1939. Oil from poppy. (Ital). Arch. Farmacol. Sperim. Sci. Affini 67(5): 163-166. 396.8 Ar22.

Physical characteristics of oil from *P. somniferum*. Wild *P. rhoeas* contains oil with different characteristics.

1961. ZANDA, G. B. 1939. Opium from Sardinia. (Ital). Arch. Farmacol. Sperim. Sci. Affini 67(2): 29-31. 396.9 Ar22.

Opium from several varieties of *P. somniferum* was analyzed for morphine, moisture, aqueous insoluble residue and water soluble fractions.

1962. ZAPROMETOFF, N. G. 1925. Diseases of cultivated plants in Middle Asia. (Rus). Uzberkistan Plant Protection Sta., Phytopathol. Sect., Tashkent. 165 pp. Abstr. in Rev. Appl. Mycol. 5: 174-175. 1925. 450 R328.

Erysiphe cichoracearum and *Peronospora arborescens* on *Papaver somniferum*.

1963. ZARAYCKA, H. 1958. The fungus flora of opium poppy seeds. (Pol; summ. Rus and Eng). Rocn. Nauk Roln. Ser. A, Rostl. 78: 309-342. 20.5 R59.

The microflora associated with poppy seeds was examined in 500 samples from various regions of Poland. Those found injurious to seeds and seedlings were *Helminthosporium papaveris*, *Fusarium scirpi* var. *caudatum* and *Alternaria* sp.

1964. ZAWAHRY, M. R. 1962. Microbiological assay of niacin. Egypt. Pharm. Bull. 44(4): 139-149. MAM: W3 PA495p.

Niacin content of 2 month old plants of P. somniferum was included among the Egyptian medicinal plants assayed.

1965. ZDARKOVA, E. 1967. Stored food mites in Czechoslovakia. J. Stored Prod. Res. 3(2): 155-175. 421 J829.

Poppy seed was infested in food processing factories with Acarus siro, Tyrophagus putrescentiae, Glycyphagus destructor, G. fustifer, Chortoglyphus arcuatus and Gohieria fusca.

1966. ZDENDA, H. 1955. The breeding of poppies for the increased content of morphine. (Czech; summ. Rus and Ger). Preslia 27(4): 368-382. 450 P92.

High rainfall and low temperature toward the end of the vegetative period of P. somniferum lowers the alkaloid content. Differences between 17 varieties are statistically recorded.

1967. ZEBRAK, E. A. 1968. The effect of polyploidy on the photoperiodic reaction of opium poppy and love-in-a-mist. (Rus). Madl. Glav. Bot. Sada 70: 105-107. 451 M854.

Papaver somniferum, especially tetraploids, showed advanced plant development and flowering when grown under 24-hour days while 8- and 12-hour days retarded development.

1968. ZEKERT, O. 1926. Indian opium. Arch. Pharm. (Berlin) 264(3): 237-248. MAM.

A history of opium exportation from India giving yearly amounts and destination. Production figures are given from 1797-1919.

1969. ZEMANEK, J. 1967. Study of the possibility of application of herbicides in the culture of poppy. (Czech). Agrochemia (Bratislava) 7(5): 147-148. 385 Ag88.

Field trials of different herbicides.

1970. *ZEMANEK, J. 1971. Small-plot field experiments on chemical control of weeds in poppy. (Czech). Ochr. Rostl. 7(3): 179-218. 464.8 Oc3.

1971. ZEMANEK, J., and J. AMBROZOVA. 1967. The study of the effect of amitrol on the respiration and activity of some enzymes in poppy plants (*Papaver somniferum* L.). (Summ. Czech and Rus). Biol. Pl. 9(4): 270-275. 450 B52.

Poppy seedlings showed no external injury to soil application of amitrol but catalase activity was lowered by 60% after the first day, respiration gradually decreased and after the fourth day polyphenoloxidase activity was stimulated.

1972. ZENDER, J. 1928. The poppy and its use by the Assyrians. (Fr). Bull. Soc. Bot. Geneve 20: 379-381. 451 C283B.

Assyrians used the analgesic properties of poppy to treat eye disorders and in suppositories for the treatment of intestinal diseases.

1973. ZENKERT, C. A. 1934. The flora of the Niagara frontier region. Bull. Buffalo Soc. Nat. Sci. 16: 328 pp. SI: QK177 Z55.

Papaveraceae are given on pp. 162-163 and include *P. somniferum* and *P. rhoeas*.

1974. ZHDANOVA, L. P. 1964. The content of volatile acids in the leaves and seeds of ripening oil-bearing plants. (Rus). Dokl. Akad. Nauk SSSR 156(5): 1229-1231. 511 P444A.

In leaves of sunflower, poppy and flax, the organic acids increased until flowering and then declined. Total organic acids and oil were inversely related.

1975. ZHDANOVA, L. P. 1968. The effect produced by temperature on the content of volatile acids in seeds and leaves of oil-bearing plants. (Rus). Dokl. Akad. Nauk SSSR 182(3): 719-722. 511 P444A.

Sunflower, poppy and flax leaves and seeds accumulated more volatile fatty acids at temperatures of 13°-18°C than at 23°-25°C.

1976. ZHDANOVA, L. P. 1969. Effect of temperature on the synthesis of fats in maturing seeds of oil crops. (Rus; summ. Eng). Fiziol. Rast. 16(3): 488-497. 450 F58.

Low temperatures increase the oil content of poppy seeds.

1977. ZHUKOVSKIĬ, P. M., and N. A. BASILEVSKAYA. 1933. Opium poppies ("Khashkaw"), pp. 476-507. *In* La Turquie Agricole. (Partie Asiatique-Anatolie). Mosc.-Lening. 34.5 Z62.

Production and cultivation of poppy in different areas of Turkey. Morphological characteristics are given with a key for identification of subspecies.

1978. ZHURAVLEV, Y. P., and V. V. SHEBERSTOV. 1970. Effect of mineral fertilizers on yield and quality of poppy. (Rus). Khimiya sel'.-Khoz. 8: 25-28. 385 K524.

Yields of seed and capsules were increased on chernozem soil by addition of 60 kg N and 60 kg P_2O_3/ha.

1979. ZOGG, H. 1945. Poppy leaf blight. (Ger). Verh. Schweiz. Naturf. Ges. 125: 172. 508 B452.

Dendryphium penicillatum attacks all parts of the poppy plant at all stages of development.

1980. ZOGG, H. 1945. Poppy leaf blight (*Pyrenophora calvescens* (Fr.) Sacc., conidial stage *Dendryphium penicillatum* (Cda.) Fr.). (Ger). Ber. Schweiz. Bot. Ges. 55: 240-269. 451 Sch9.

All parts of the plant are attacked; latex production is reduced and the plant is weakened so that infection by other disease agents follows.

1981. ZOGG, H. 1946. The heart rot of the oil poppy (*Papaver somniferum* L.) and its control. (Ger). Ber. Schweiz. Bot. Ges. 56: 5-12. 451 Sch9.

Heart rot appears in highly chalky soil but there is no clear connection between soil pH and the occurrence of the disease. It can be controlled with the addition to the soil of boric acid or borax.

1982. ZOGG, H. 1946. Contribution to the knowledge of plant defense reactions. The influence of temperature on the development of the gummous demarcation zone. (Ger; summ. Fr). Ber. Schweiz. Bot. Ges. 56: 507-522. 451 Sch9.

When *P. somniferum* is attacked by the condial stage of *Pyrenophora calvescens* one can isolate the fungus by formation of gumming demarcation zones at temperatures unfavorable to the fungus.

1983. ZOHARY, M. 1946. The flora of Iraq and its phytogeographical subdivision. Bull. 31. Baghdad. pp. 201. SI: 581.9567 Z86.

There are 11 species of *Papaver* including *P. somniferum* in the Papaveraceae (pp. 63-65).

1984. ZOHARY, M. 1966. Flora Palaestina. Part I. The Israel Academy of Sciences and Humanities, Jerusalem. 364 pp. SI: QK378 Z85.

The Papaveraceae are given on pp. 224-233 and include 7 species of *Papaver*, *P. hybridum*, *P. argemone*, *P. carmeli*, *P. subpiriforme*, *P. syriacum*, *P. polytrichum*, *P. humile* subsp. *sharonense* and subsp. *humile*.

1985. ZOSCHKE, M. 1962. The genetic variability of the alkaloid content of *Papaver somniferum* L. (Ger). Angew. Bot. 36(3/4): 185-192. 450 An4.

The morphine content in the capsules of varieties, bred in Germany for high oil and seed production, is normally 0.2-0.4%. There are white varieties with up to 0.6%.

1986. ZOSCHKE, M. 1963. Mineral nutrition and morphine formation in *Papaver somniferum* L. (Ger; summ. Eng). Z. Acker-Pflanzenbau 116(4): 317-326. 18 J825.

Alkaloid synthesis was highly dependent on N nutrition, the morphine content varying from 0.09 to 0.70% with various additions of ammonium nitrate.

1987. ZSADON, B. 1960. Investigations of aqueous extracts obtained from poppy heads. (Hung; summ. Ger). Magyar Kem. Folyoirat 66(9): 347-350. 385 M272.

The aqueous extracts contained certain compounds which changed the polarographic stage of morphine to give a higher morphine content.

1988. ZSADON, B. 1966. Preparation of narcotoline from poppy capsules. (Ger; summ. Hung). Herba Hung. 5(2-3): 205-210. 71.8 H413.

The selective extraction of narcotoline and morphine is described.

1989. ZSADON, B. 1968. Extraction of morphine from the poppy capsules with organic solvents, and pertinent analytical studies. (Hung; summ. Rus and Ger). Herba Hung. 7(1): 47-52. 71.8 H413.

The polarographic determination of morphine in poppy extracts gives values that are consistently too high because of the presence of other cathodically reducible impurities.

1990. ZSADON, B., and A. GERECS. 1964. Poppyhead extracts, II. (Hung; summ. Ger). Magyar Kem. Folyoirat 70(2): 49-51. 385 M272.

Quantitative extraction of morphine.

1991. ZSADON, B., and A. GERECS. 1964. Isolation of alkaloids from poppies. Hung. 151.555. Appl. May 18, 1963. 3 pp. (Chem. Abstr. 61.13133g. 1964).

Separation of narcotoline from the aqueous concentrate of extracts improves the isolation of morphine.

1992. ZSADON, B., and A. GERECS. 1965. Solubility of morphine in aqueous solutions in the presence of impurities extracted from poppy capsules. (Hung; summ. Ger). Magyar Kem. Folyoirat 71(6): 233-234. 385 M272.

In extraction of poppy capsules, the impurities accompanying the morphine increase its solubility in water causing significant losses in yield. Methods for eliminating this loss are described.

1993. ZSADON, B., and T. PAAL. 1968. Quantitative polarographic determination of the morphine content of poppy capsules. (Ger). Acta Chim. Acad. Sci. Hung. 57(3): 323-333. 385 Ac83.

1994. *ZSADON, B., and T. PAAL. 1969. Kinetic routine method for the polarographic determination of the morphine content of the poppy capsule. (Hung). Herba Hung. 8(1/2): 157-158. 71.8 H413.

The known polarographic method of Baggegaard-Rasmussen is studied and an improved procedure recommended.

1995. ZSOAR, K. 1966. Control of the poppyhead pest. (Hung). Magyar Mezogazd. 21(23): 15-16. 19 M27.

DDT control of _Ceutorrhynchus_ _macula-alba_.

1996. ZSOLT, J. 1947. The effects of eosin on germinating seeds. (Fr). Borbasia 7(1/10): 27-30. 450 B642.

Seeds of _P_. _somniferum_ which had been soaked in eosin showed, on germination, a shorter hypocotyl and a longer root than the controls. Since the roots often showed negative geotropism, eosin may inhibit the effectiveness of the active auxin.

1997. ZUNDEL, G. L. I. 1939. Additions and corrections to Ustilaginales. North American Flora 7(14): 971-1030. 454 N48.

Entyloma _fuscum_ on _P_. _somniferum_ and _P_. _rhoeas_ in Bermuda.

1998. *ZURAVLEV, J. P., and V. V. SEBERSTOV. 1970. The effect of mineral fertilizers on the yield and quality of oil poppy. (Rus). Himija sel' Hoz. 8(8): 25-28.

Application of P increased capsule yields of Novinka 198 poppy 13-30%, NP 30-37%. Adding N improved the effectiveness of P and enhanced morphine accumulation in capsules, especially if applied during intensive growth stages. Different types of N and P fertilizers did not differ in their effect on morphine content of the capsules.

1999. ZYUBIN, B. 1962. Protection of the opium poppy from pests and diseases. (Rus). Sel'sk. Khoz. Kirgizii 1962(1): 31-33. 20 Se493.

In Kirgiziya, *P. somniferum* is damaged by elaterid larvae, Melolonthinae, burrowing Noctuidae and is infected with helminthosporiosis and other fungal diseases and bacterioses. Crop rotation at 4 year intervals is important.

2000. ZYUBIN, B. N. 1969. Plant nematodes of the opium poppy in Kirigizia. (Rus). Frunze: Izadatelstvo "Ilim". 100 pp. QL391 N4Z5.

Fifty-six nematodes associated with the opium poppy are described and their relationships with other pathogens are discussed.

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Narcotine - 0037, 0062, 0126, 0129, 0130, 0132, 0133, 0134, 0172, 0179, 0188, 0196, 0198, 0212, 0273, 0313, 0321, 0322, 0348, 0371, 0372, 0374, 0388, 0473, 0553, 0582, 0605, 0695, 0696, 0697, 0716, 0723, 0728, 0756, 0763, 0772, 0773, 0775, 0785, 0831, 0832, 0903, 0907, 0984, 1005, 1039, 1040, 1064, 1098, 1119, 1122, 1161, 1162, 1181, 1182, 1226, 1271, 1347, 1368, 1370, 1407, 1435, 1477, 1500, 1530, 1559, 1588, 1589, 1592, 1593, 1666, 1667, 1728, 1791, 1810, 1813, 1817, 1841, 1843, 1903, 1927, 1988.

Narcotoline - 0133, 0196, 0197, 0372, 0374, 0375, 0586, 0695, 0696, 0697, 1181, 1182, 1260, 1347, 1368, 1369, 1370, 1406, 1755, 1810, 1843, 1928, 1991.

Neopine - 0372.

Norsanguinarine - 0540.

Nuciferine - 0994, 1130, 1356, 1371, 1372, 1431.

Nuciferoline - 1356, 1371, 1372.

Nudaurine - 0213, 0414, 0828, 1387.

Oreodine - 0351, 0410, 1356, 1375, 1378, 1379, 1380, 1382.

Oreogenine - 0351, 1356, 1378, 1379, 1380.

Oreoline - 1104, 1377, 1379.

Oreophiline (mecambrinidine) - 1356, 1365, 1375, 1378, 1379, 1387.

Orephitine - 0699.

Oridine - 1573.

Orientalidine - 0317, 1427, 1431, 1432, 1673.

Orientaline - 0116.

Orientalinone - 0120, 0394, 0699, 0700.

Oripavine - 0203, 0617, 0891, 0936.

Oxeocyclohexandienane oxidine - 1130.

Oxomuramine - 0504.

Oxycryptopine - 0254.

Oxyprotine - 1132.

Oxysanguinarine - 0540, 1130, 1256, 1432.

Palaudine - 0252.

Palmatine - 0994, 1356, 1374, 1426, 1432, 1433, 1684.

Papaveraldine - 0375, 1475.

Papaverine - 0010, 0018, 0037, 0062, 0124, 0128, 0134, 0172, 0176, 0179, 0188, 0196, 0197, 0212, 0245, 0264, 0267, 0273, 0322, 0348, 0371, 0372, 0375, 0388, 0415, 0473, 0562, 0605, 0633, 0693, 0695, 0696, 0697, 0716, 0728, 0756, 0757, 0763, 0772, 0773, 0785, 0831, 0832, 0903, 0907, 0984, 1005, 1039, 1040, 1064, 1107, 1119, 1122, 1161, 1162, 1181, 1182, 1183, 1190, 1192, 1206, 1226, 1256, 1271, 1347, 1407, 1435, 1475, 1500, 1530, 1589, 1592, 1593, 1666, 1667, 1728, 1755, 1770, 1771, 1782, 1783, 1787, 1791, 1810, 1813, 1817, 1841, 1843, 1868, 1904.

Papaverrubine - 0375, 0394, 0410, 0741, 0994, 1102, 1103, 1256, 1350, 1353, 1356, 1361, 1362, 1364, 1365, 1367, 1374, 1375, 1376, 1379, 1384, 1387, 1570, 1577, 1895.

Pavonoline - 1386, 1387.

Porphyroxine - 0251, 0253, 0563, 0739, 0995, 1359, 1374, 1383, 1384, 1471, 1472.

Pronuciferine - 1356, 1372, 1373, 1374.

Protopine (argemonine) - 0126, 0372, 0374, 0435, 0540, 0693, 0820, 0903, 0994, 0996, 1129, 1130, 1181, 1256, 1365, 1367, 1373, 1374, 1375, 1378, 1384, 1387, 1426, 1432, 1433, 1684.

Reticuline - 0107, 0122, 0123, 0124, 0243, 0246, 0247, 0248, 0250, 0255, 0348, 0375, 0830, 1115, 1116.

Rhoeadine - 0734, 0820, 0913, 1129, 1130, 1256, 1340, 1363, 1367, 1375, 1378, 1382, 1384, 1387, 1435, 1531, 1570, 1572, 1575, 1576, 1684, 1685, 1918.

Rhoeagenine - 0410, 0820, 1130, 1256, 1367, 1378, 1384, 1387, 1570, 1684.

Roemerine (apoheine) - 0105, 0106, 0435, 0994, 1256, 1371, 1373, 1374, 1376, 1378, 1683.

Sanguinarine - 0540, 0650, 0994, 1130, 1256, 1367, 1374, 1375, 1376, 1684.

Scoulerine (aurotensine) - 0243, 0258.

Sinactine - 1256, 1356, 1367.

Stylopine - 1256.

Thebaine - 0010, 0037, 0062, 0068, 0117, 0121, 0122, 0125, 0134, 0172, 0176, 0177, 0187, 0188, 0196, 0198, 0199, 0200, 0202, 0203, 0212, 0243, 0259, 0267, 0273, 0281, 0291, 0306, 0315, 0317, 0328, 0348, 0369, 0371, 0372, 0374, 0375, 0385, 0388, 0393, 0459, 0468, 0469, 0470, 0473, 0503, 0530, 0562, 0582, 0605, 0615, 0617, 0628, 0664, 0695, 0696, 0697, 0716, 0723, 0728, 0738, 0757, 0763, 0772, 0773, 0785, 0820, 0831, 0832, 0903, 0907, 1005, 1027, 1040, 1064, 1107, 1115, 1116, 1119, 1122, 1123, 1130, 1160, 1161, 1162, 1181, 1182, 1183, 1192, 1260, 1261, 1262, 1263, 1264, 1347, 1368, 1370, 1407, 1425, 1431, 1434, 1435, 1475, 1488, 1519, 1530, 1587, 1588, 1589, 1592, 1593, 1658, 1666, 1728, 1730, 1731, 1770, 1782, 1783, 1787, 1791, 1813, 1840, 1841, 1842, 1843, 1868, 1898, 1903, 1907.

Xanthopetaline - 1129.

ALTERNATIVE CROPS - 0059, 1831, 1850, 1910.

BIBLIOGRAPHY - 0135, 0336, 0400, 0542, 0821, 0828, 0989, 0993, 1057, 1351, 1568, 1591.

CHEMISTRY (other than alkaloids; see also Oil, Opium, Seeds, and Straw).

Amino Acids - 0173, 0787, 0825, 0904, 0914, 0973, 0974, 0975, 1161, 1252, 1413, 1414, 1415, 1416, 1644, 1764, 1964.

Carbohydrates - 0004, 0006, 0673, 0725, 0802, 1298, 1413, 1741, 1750, 1751, 1922, 1923.

Enzymes - 0072, 0474, 0475, 0586, 0803, 0804, 0805, 0806, 0811, 0830, 0976, 0977, 0978, 0979, 0980, 1056, 1152, 1252, 1518, 1612, 1613, 1614, 1697, 1807, 1971.

Flavones - 0655, 0656, 0657, 0915, 1248, 1436, 1696, 1699.

Latex - 0205, 0463, 0464, 0468, 0469, 0997, 1369, 1383, 1807.

From *Papaver bracteatum* - 1658.

Neutral fraction - 0217, 0392, 0420, 0427.

Organic acids - 0332, 0807, 0953, 1414, 1418, 1765, 1974, 1975.

Pigments - 0005, 0006, 0384, 0814, 0856, 1361, 1408, 1619, 1816.

Sterols - 1125.

Wax - 0721, 0722, 1737, 1747.

CONTAMINANTS - 0137, 0808.

CYTOLOGY - 0449, 0457, 0735, 0941, 0943, 1293, 1301, 1337, 1590, 1861.

Cell division - 0282, 0307, 0758, 0879, 1096.

Chromosome numbers - 0378, 0483, 0484, 0485, 0729, 0917, 0918, 0942, 1067, 1069, 1070, 1141, 1249, 1499, 1744.

Chromosome structure - 0068, 0618, 0669, 0816, 0901, 0919, 0940, 1009, 1053, 1097, 1762, 1811, 1934, 1935, 1936, 1937, 1938, 1939, 1940, 1941, 1942.

Latex - 0207, 0465.

Plastids - 1750, 1751.

Ultrastructure - 1792.

DISEASES AND PESTS

Bacterial diseases - 0148, 0223, 0442, 0450, 0665, 0670.

Austria - 1621.

Bulgaria - 0288, 0872, 0873, 0874.

Czechoslovakia - 1545, 1546.

India - 0288, 0316, 1478.

Japan - 0525, 1126, 1766.

Poland - 0549.

Rumania - 0408, 1653.

Tanganyika - 1032.

U.S. - 0271, 0419, 1834.

U.S.S.R. - 0149, 0599.

Yugoslavia - 0912.

Fungus diseases - 0093, 0144, 0146, 0148, 0160, 0350, 0366, 0386, 0502, 0555, 0577, 0620, 0621, 0622, 0623, 0624, 0645, 0665, 0681, 0687, 0825, 0860, 0890, 0929, 0932, 0963, 0964, 1133, 1148, 1196, 1215, 1216, 1234, 1339, 1444, 1597, 1622, 1625, 1633, 1644, 1714, 1959.

Argentina - 0671, 0672, 1106, 1233, 1321.

Australia - 0033, 0034, 0035, 0036, 0138, 0241.

Austria - 0642, 0853, 1342, 1440, 1621.

Bermuda - 1899, 1997.

Brazil - 0325, 1218.

Bulgaria - 0074, 0097, 0324, 0642, 0871, 0872, 0875, 0876, 1598.

China - 1763.

Cyprus - 0566.

Czechoslovakia - 0642, 0983, 1211, 1212, 1214, 1643, 1902.

Denmark - 0642, 1048, 1242, 1243, 1244, 1245, 1716, 1717.

Egypt - 0240, 0642, 1154.

France - 0066, 0237, 0379, 0380, 0424, 0522, 0642.

Finland - 0642, 1492.

Germany - 0236, 0276, 0412, 0642, 0737, 0786, 0889, 1084, 1124, 1146, 1147, 1220, 1247, 1275, 1308, 1503, 1507, 1508, 1881, 1979, 1980, 1981, 1982.

Great Britain - 0138, 0343, 0506, 0512, 0558, 0642.

Hungary - 0235, 0612, 0642, 1191, 1343, 1815, 1919.

India - 0038, 0294, 0295, 0296, 0297, 0316, 0397, 0642, 0960, 0961, 0962, 1173, 1324, 1325, 1641, 1754, 1838.

Iran - 1344, 1610.

Israel - 0323, 1303, 1505.

Italy - 0163, 0308, 0326, 0642, 1318, 1319, 1320, 1345, 1554, 1555, 1919.

Japan - 0525, 0685, 0686, 0688, 0751, 0769, 0770, 1127, 1602, 1603, 1604, 1605, 1606, 1768, 1795.

Morocco - 1517.

Netherlands - 0642, 1076, 1078, 1299, 1851, 1852, 1853.

New Zealand - 0263.

Norway - 0642, 1049.

Pakistan - 0007, 1958.

Poland - 0097, 0528, 0549, 0642, 1167, 1395, 1560, 1963.

Portugal - 1703.

Rumania - 0216, 0408, 0440, 0642, 1288, 1338, 1467, 1468, 1599, 1600, 1601.

Spain - 1066, 1241.

Sweden - 0158, 0438, 0642, 1797.

Switzerland - 0352, 0642, 1134, 1135.

Taiwan - 0325, 1606, 1768.

Thailand - 0314.

Turkey - 0232, 0233, 0584, 0585.

Uruguay - 0928, 1198.

U.S. - 0325, 0706, 0744, 1466, 1734, 1834.

U.S.S.R. - 0013 0214, 0215, 0269, 0270, 0274, 0406, 0431, 0486, 0548, 0576, 0578, 0579, 0594, 0642, 0827, 1013, 1054, 1120, 1184, 1204, 1224, 1235, 1236, 1285, 1421, 1455, 1649, 1669, 1688, 1962, 1999.

Yugoslavia - 0221, 0642, 0646, 0892, 0912, 0933, 1051, 1170, 1171, 1307, 1485, 1678, 1946, 1947, 1948.

Microorganism antagonism - 0381, 0382, 0412, 1234.

Of opium - 0161, 1459.

Insect pests - 0017, 0075, 0087, 0148, 0192, 0502, 0587, 0645, 0652, 0768, 0826, 1109, 1216, 1323, 1483, 1626, 1639, 1679, 1874.

  - Austria - 0428, 1621.
  - Bulgaria - 0088, 1712.
  - Czechoslovakia - 0983, 1542, 1543, 1719, 1965, 1995.
  - Europe - 1630.
  - France - 0088.
  - Germany - 0684, 0965, 0966, 1195, 1273, 1275, 1276, 1277, 1308.
  - Hungary - 0088, 1504, 1579, 1580, 1757.
  - Italy - 0391.
  - Poland - 0298.
  - Sweden - 0898, 0899, 0900.
  - Taiwan - 0413.
  - Thailand - 1391.
  - U.S.S.R. - 0088, 0193, 1285, 1313, 1326, 1329, 1330, 1331, 1332, 1669, 1999.
  - Yugoslavia - 0088, 0221, 0302.

- Nematodes - 0665, 2000.
  - Czechoslovakia - 1643.
  - Germany - 0889.
  - Israel - 1180, 1505.
  - Netherlands - 0171.
  - U.S. - 1834.

- Predation
  - Animals - 0319, 1014, 1043, 1894.

Birds - 0219, 1931.

Man - 0494, 0967.

Virus diseases - 0148, 0652, 0718, 0719, 1136, 1547, 1733.

Australia - 1266.

Austria - 1621.

Bulgaria - 0970, 0971.

Czechoslovakia - 1544.

Germany - 0684.

Lebanon - 1616.

Netherlands - 0329.

Poland - 0528.

South Africa - 0409, 0429.

U.S. - 0152, 1834.

ECOLOGY - 0076, 0109, 0404, 0456, 0546, 0565, 0572, 0591, 0611, 0614, 0658, 0660, 0661, 0763, 0779, 0918, 1003, 1018, 1142, 1210, 1287, 1305, 1516, 1611, 1672, 1691, 1799, 1812, 1864, 1877, 1880, 1920.

ECONOMICS - 0025, 0137, 0399, 0731, 0783, 0808, 0924, 0947, 1155, 1496, 1836, 1860, 1869, 1911, 1968.

ETHNOLOGY - 1831, 1924.

FLOWER (See also Morphology) - 0015, 0061, 0086, 0113, 0169, 0180, 0448, 0482, 0517, 0603, 0604, 0630, 1047, 1145, 1207, 1222, 1284, 1327, 1596, 1767.

Bud - 0168, 0879, 1232, 1590.

Color - 0005, 0006, 0184, 0455, 0456, 0730, 0814, 0823, 1186, 1188, 1247, 1248, 1267, 1390, 1534, 1664, 1698.

Embryo - 0603, 0604, 0758, 0762, 1700, 1701, 1702, 1811, 1870.

Excised ovules - 1087, 1088, 1419.

Gametophyte - 1952.

Insect basking - 0715.

Petal - 0456, 1186, 1187, 1883.

Pollination - 0383, 0514, 0762, 0795, 0860, 1142, 1400, 1691, 1882.

Intra-ovarian - 0833, 0834, 0835, 1089, 1090.

Redox Potential - 0147.

Stamen - 0856, 0959, 1697.

Stigma - 0185, 1707, 1808, 1884, 1915.

Teratology - 0180, 0454, 0590, 0592, 0598, 0851, 0940, 1036, 1052, 1156, 1199, 1210, 1470, 1521, 1564, 1656, 1660.

Unisexual flowers - 1210.

FOLKLORE - 0322, 0434, 1158, 1463, 1912, 1924.

FRUIT (See also Morphology) - 0003, 0011, 0285, 0483, 0518, 0524, 0730, 0945, 1037, 1038, 1438, 1441, 1442, 1444, 1527, 1664.

Dehiscence - 0078.

Parthenocarpy - 1246.

Physiology - 0285, 0524, 0602, 0605, 0606, 0866, 1025, 1415, 1416, 1417, 1418, 1446, 1447, 1448, 1449, 1450, 1451.

Relative humidity - 0866.

GENETICS

Albinism - 0175, 1390.

Atavism - 0184.

Heterosis - 0708, 0711, 0956, 1117, 1168, 1213, 1215, 1422, 1581, 1585, 1593.

Hybrids, intergeneric - 1814.

Hybrids, interspecific - 0068, 0181, 0182, 0183, 0199, 0200, 0218, 0457, 0598, 0659, 0735, 0736, 0767, 0824, 0838, 0839, 0845, 0901, 0943, 1053, 1063, 1064, 1065, 1142, 1143, 1144, 1287, 1389, 1400, 1489, 1500, 1525, 1562, 1691, 1779, 1783, 1841, 1872, 1926, 1934, 1935, 1936, 1937, 1938, 1939, 1941, 1942.

Hybrids, intraspecific - 0022, 0024, 0028, 0143, 0175, 0279, 0311, 0338, 0359, 0373, 0374, 0377, 0455, 0456, 0659, 0691, 0705, 0708, 0710, 0711, 0713, 0778, 0823, 0862, 0918, 0919, 0930, 0948, 0956, 1017, 1020, 1021, 1117, 1128, 1141, 1168, 1185, 1186, 1187, 1188, 1203, 1213, 1247, 1267, 1390, 1422, 1460, 1524, 1527, 1584, 1585, 1591, 1593, 1677, 1698, 1699, 1843, 1915, 1917, 1925, 1940, 1985.

Mutagenesis - 0777, 1511, 1677.

Polyploidy - 0030, 0031, 0307, 0539, 0986, 1164, 1873, 1967.

Sterility - 0736, 1526, 1677.

GEOBOTANY - 0611, 0851.

GERMINATION - 0020, 0278, 0416, 0417, 0492, 0495, 0526, 0570, 0572, 0600, 0622, 0623, 0626, 0641, 0661, 0662, 0834, 0835, 0896, 0897, 0925, 1008, 1144, 1258, 1511, 1670, 1758, 1790, 1793, 1996.

Detergent inhibition - 1304.

Fluorine effect - 1238, 1239, 1240.

Light requirements - 1269, 1270.

HISTORY - 0009, 0032, 0109, 0157, 0283, 0318, 0330, 0349, 0390, 0434, 0543, 0619, 0644, 0675, 0726, 0821, 0836, 0987, 1033, 1041, 1080, 1081, 1113, 1231, 1300, 1328, 1351, 1502, 1514, 1533, 1680, 1745, 1777, 1864, 1869, 1897, 1900, 1924, 1929, 1968, 1972.

HORTICULTURE - 0046, 0047, 0048, 0050, 0051, 0052, 0085, 0279, 0292, 0330, 0358, 0359, 0360, 0361, 0362, 0363, 0364, 0451, 0454, 0492, 0496, 0507, 0529, 0591, 0647, 0745, 0752, 0754, 0796, 0922, 1060, 1061, 1062, 1118, 1140, 1208, 1257, 1397, 1631, 1848, 1913.

LEGAL - 0009, 0439, 0508, 0609, 1006, 1079, 1403, 1532, 1561, 1823, 1827, 1832, 1835, 1836.

LITERATURE, OPIUM IN - 0349, 0675, 1113, 1777, 1929.

MORPHOLOGY (See also Flower, Fruit, Pollen, Seed and Stem) - 0076, 0167, 0441, 0449, 0485, 0511, 0515, 0516, 0538, 0658, 0755, 0846, 0848, 1042, 1145, 1163, 1393, 1549, 1590, 1591, 1800, 1812.

  Latex tubes - 0011, 0012, 0169, 0400, 0411, 0465, 0487, 0488, 1030, 1589, 1594, 1793, 1954, 1955.

  Necrosis - 0753, 0754.

  Ontogeny - 1549, 1551, 1590.

  Peduncle movement - 0183, 0501, 0538, 0762, 1635, 1743.

OIL - 0025, 0063, 0226, 0331, 0513, 0589, 0997, 1157, 1306, 1558, 1911, 1960.

  Biosynthesis - 1416, 1751.

  Chemistry - 0054, 0060, 0064, 0091, 0111, 0112, 0238, 0497, 0498, 0499, 0500, 0509, 0510, 0639, 0645, 0702, 0840, 0992, 1046, 1862.

  Ontogeny - 0524, 0802, 1412, 1974.

  Papaver rhoeas - 0077, 1960.

  Processing - 1819.

  Storage - 0497, 0498, 0499, 0500.

  Yield - 0026, 0057, 0082, 0083, 0189, 0209, 0285, 0319, 0395, 0545, 0569, 0601, 0632, 0780, 0781, 0790, 0930, 1012, 1046, 1059, 1099, 1197, 1225, 1251, 1280, 1281, 1289, 1448, 1490, 1628, 1629, 1657, 1705, 1706, 1708, 1746, 1759, 1809, 1818, 1913, 1976.

OPIUM [See also Utilization, Statistics (production by country)] - 0011, 0032, 0045, 0062, 0071, 0098, 0135, 0155, 0157, 0280, 0283, 0508, 0532, 0693, 0809, 0821, 0836, 0882, 0883, 0884, 0989, 1033, 1041, 1081, 1306, 1366, 1403, 1727, 1824, 1829.

Absence - 0837.

Addiction - 0344, 0675, 1532, 1924.

Chemical composition - 0037, 0041, 0043, 0069, 0071, 0134, 1210, 0224, 0243, 0244, 0246, 0247, 0248, 0249, 0250, 0251, 0252, 0254, 0255, 0256, 0257, 0258, 0260, 0261, 0262, 0267, 0271, 0273, 0320, 0339, 0427, 0534, 0537, 0553, 0561, 0634, 0740, 0787, 1355, 1357, 1398, 1407, 1437, 1459, 1471, 1472, 1473, 1474, 1475, 1530, 1535, 1539, 1563, 1634, 1666, 1689, 1728, 1748, 1776, 1778, 1802, 1813, 1844, 1868, 1875, 1900, 1961.

Control - 0299, 0609, 1328, 1828, 1835.

  Austria - 1006.

  China - 0014, 1502.

  Czechoslovakia - 1006.

  Denmark - 1006.

  Egypt - 0439.

  Germany - 1006.

  Hungary - 1006.

  India - 0014, 0102, 1502.

  Iran - 0508, 1079, 1532, 1561.

  Japan - 0508.

  Korea - 0508, 1027.

  Mexico - 0103, 0104, 0280.

  Netherlands - 1009.

  Poland - 0436.

  Thailand - 0508.

Togo - 0809.

U.S. - 1832.

Yugoslavia - 1006.

Eating - 0014, 1082, 1704.

Geography

Afghanistan - 0299, 0533, 0615.

Argentina - 0299.

Bulgaria - 0299, 0761.

Burma - 0299, 1825.

Canada - 0299.

China - 0154, 0267, 0299, 0390, 0434, 0534, 0615, 0731, 0799, 1080, 1328, 1704, 1745, 1924.

Ecuador - 0299, 0615.

Egypt - 0049, 0543, 0556, 0799.

England - 1328, 1745.

France - 0299, 0318.

Germany - 0156, 0299, 1788.

Greece - 0615, 1328.

India - 0040, 0041, 0042, 0102, 0154, 0299, 0533, 0534, 0557, 0615, 0799, 0877, 1107, 1155, 1328, 1457, 1473, 1474, 1475, 1476, 1477, 1478, 1662, 1745, 1826.

Iran - 0037, 0154, 0299, 0533, 0534, 0557, 0615, 0799, 1079, 1138, 1457, 1826.

Italy - 0299, 0339.

Japan - 0069, 0070, 0615.

- Korea - 0615, 1027.
- Laos - 0299, 1825, 1912.
- Manchuria - 0064, 0534.
- Mediterranean region - 1458.
- Mexico - 0299, 0615, 0616.
- Norway - 1279.
- Pakistan - 0299, 0615, 0757, 0764.
- Panama - 0299.
- Peru - 0299, 1745,
- Sardinia - 0422.
- Thailand - 0299, 1825.
- Turkey - 0037, 0154, 0299, 0533, 0557, 0615, 0840, 1107, 1457, 1822, 1826.
- U.S. - 1827.
- U.S.S.R. - 0037, 0299, 1004.
- Yugoslavia - 0108, 0154, 0299, 0533, 0615, 1844.

Harvest - 0038, 0039, 0042, 0043, 0069, 0149, 0156, 0344, 0601, 0625, 0627, 0757, 0764, 0799, 0847, 0864, 1003, 1138, 1478, 1514, 1523, 1662, 1675, 1676, 1680, 1694, 1822, 1929, 1957.

Marihuana, Contaminant of - 0724.

Microscopy - 0536, 0557.

Origin - 0476, 0533, 0534, 0535, 0557, 0615, 0616, 0761, 0772, 0773, 0787, 1002, 1107, 1457, 1458, 1825, 1865, 1868.

Storage - 0001, 0044, 0344, 0418, 1369, 1459, 1478, 1612, 1900.

Yield - 0016, 0042, 0403, 0405, 0596, 0765, 0848, 0868, 0880, 0881, 1083, 1225, 1290, 1422, 1664, 1833, 1939.

PALEOBOTANY - 0519, 1506, 1516.

PAPAVERACEAE - 0002, 0015, 0019, 0061, 0079, 0085, 0086, 0099, 0113, 0136, 0165, 0166, 0169, 0239, 0265, 0301, 0335, 0340, 0341, 0345, 0353, 0354, 0357, 0368, 0389, 0407, 0437, 0446, 0448, 0478, 0482, 0491, 0515, 0544, 0547, 0564, 0608, 0651, 0657, 0663, 0683, 0701, 0725, 0726, 0742, 0748, 0813, 0835, 0894, 0895, 0923, 0959, 0999, 1029, 1030, 1033, 1034, 1037, 1038, 1047, 1069, 1070, 1073, 1105, 1110, 1111, 1137, 1159, 1223, 1269, 1270, 1284, 1291, 1322, 1327, 1401, 1402, 1405, 1409, 1420, 1421, 1445, 1465, 1480, 1497, 1498, 1512, 1520, 1528, 1556, 1557, 1566, 1567, 1596, 1620, 1640, 1654, 1715, 1722, 1761, 1841, 1859, 1861, 1863, 1954, 1956, 1983, 1984.

PAPAVER SPP. - 0137, 0169, 0244, 0278, 0316, 0346, 0357, 0402, 0482, 0532, 0538, 0591, 0595, 0620, 0622, 0666, 0690, 0747, 0794, 0814, 0939, 0981, 1033, 1218, 1224, 1304, 1314, 1578, 1635, 1692, 1718, 1734, 1801, 1863.

PAPAVER ACROCHAETUM Bornm. - 0019, 0354.

P. ACULEATUM Thunb. - 0085, 0136, 0286, 0353, 0437, 0453, 0650, 0667, 1499, 1894, 1901.

Alkaloids - 0993, 1130.

P. AJANENSE Pop. - 1421.

P. ALBOROSEUM Hult. - 0006, 0483, 0742, 0849, 0934, 1421.

Alkaloids - 1385, 1387, 1430, 1916.

P. ALPINUM L. - 0085, 0113, 0335, 0355, 0378, 0389, 0441, 0456, 0457, 0483, 0491, 0651, 0659, 0674, 0692, 0841, 0874, 0918, 0986, 1070, 1112, 1209, 1287, 1516, 1556, 1744, 1869.

Alkaloids - 0993, 1129, 1130, 1131, 1132, 1364, 1365, 1570, 1916.

P. AMBIGUUM Pop. - 1421.

P. AMERISTOPHYLLUM Fedde - 0481.

P. AMURENSE Hort. ex Karrer - 0483.

Alkaloids - 0414.

P. ANGUSTIFOLIUM A. Tolm. - 1421.

P. ANOMALUM Fedde - 0849, 1421.

Alkaloids - 0993, 1129, 1386, 1387, 1916.

P. APICIGEMMATUM Fedde - 0481.

P. APOKRINOMENON Fedde - 0353, 0355.

P. APULUM Ten. 0006, 0020, 0353, 0355, 0378, 0483, 0674, 0692, 0849, 1141, 1209, 1221, 1322, 1497, 1744.

Alkaloids - 1684, 1916.

P. ARENARIUM Bieb. - 0211, 0353, 0354, 0355, 0389, 0481, 0674, 0771, 0849, 1190, 1209, 1322, 1421, 1556.

Alkaloids - 1434, 1916, 1951.

P. ARGEMONE L. - 0002, 0005, 0006, 0019, 0020, 0061, 0113, 0115, 0163, 0170, 0211, 0239, 0265, 0269, 0274, 0293, 0327, 0335, 0341, 0343, 0344, 0345, 0353, 0354, 0355, 0378, 0389, 0437, 0441, 0458, 0483, 0547, 0583, 0610, 0642, 0651, 0658, 0659, 0660, 0661, 0674, 0680, 0692, 0743, 0789, 0849, 0923, 0941, 1042, 1048, 1069, 1070, 1093, 1105, 1112, 1141, 1142, 1145, 1159, 1196, 1209, 1221, 1223, 1287, 1322, 1405, 1409, 1421, 1445, 1465, 1497, 1512, 1524, 1557, 1744, 1752, 1761, 1785, 1789, 1869, 1908, 1925, 1984.

Alkaloids - 0993, 1575, 1684, 1916.

P. ARMENIACUM (L.) DC. - 0019, 0085, 0353, 0354, 0389, 0483, 1744, 1869, 1983.

Alkaloids - 0936, 0937, 0993, 1684, 1916.

P. X ASHFORDENSE Worsdell (*P.* *rhoeas* x *somniferum*) - 1926.

P. ATLANTICUM (Ball) Coss. - 0085, 0115, 0327, 0355, 0378, 0483, 0501, 0650, 0849, 0901, 1070, 1556, 1597, 1744, 1752.

Alkaloids - 0993, 1384, 1434, 1575, 1684, 1916.

P. AURANTIACUM Loisel. - 0692, 0849, 1869.

P. BELANGERI Boiss. - 0211, 1322, 1421, 1556.

P. BIPINNATUM C. A. Mey. - 0211, 0354, 0481, 1421, 1556.

P. BORNMUELLERI Fedde - 0019, 0354, 1983.

P. BRACTEATUM Lindl. - 0006, 0068, 0085, 0180, 0182, 0199, 0200, 0203, 0205, 0211, 0265, 0330, 0353, 0354, 0355, 0378, 0389, 0441, 0483, 0532, 0638, 0767, 0838, 0839, 0849, 0891, 0993, 1070, 1093, 1246, 1248, 1249, 1261, 1262, 1291, 1322, 1327, 1400, 1421, 1785, 1872, 1883, 1937, 1938, 1941, 1942.

Alkaloids - 0202, 0204, 0208, 0317, 0631, 0698, 0699, 0700, 0993, 1264, 1350, 1360, 1432, 1522, 1531, 1658, 1673, 1729, 1780, 1786, 1916.

P. BURSERI Crantz - 0483, 1209, 1520, 1744.

P. CAESPITOSUM Fedde - 0481.

P. CALIFORNICUM A. Gray - 0002, 0085, 0355, 0481, 0483, 0797, 0849, 1221.

Alkaloids - 1256, 1350, 1575, 1916.

P. CANESCENS A. Tolm. - 0654, 1421.

P. CARMELI Feinbr. - 0483, 0484, 1691, 1984.

P. CAUCASICUM Bieb. - 0019, 0085, 0211, 0378, 0389, 0441, 0483, 0849, 1421, 1744, 1983.

Alkaloids - 0741, 0993, 0995, 0996, 1356, 1371, 1373, 1374, 1426, 1916, 1951.

P. CHELIDONIIFOLIUM Boiss. & Buhse - 0211, 0354, 0481, 1421.

P. CHIBINENSE N. Semen. - 0483.

P. CLAVATUM Boiss. & Hausskn. ex Boiss. - 0211, 0353, 0481.

P. COLLINUM Bogenh. - 0849.

P. COMMUTATUM Fisch. & C. A. Mey. - 0211, 0233, 0353, 0354, 0355, 0378, 0481, 0483, 0650, 0849, 1389, 1421, 1497, 1744.

Alkaloids - 1190, 1256, 1570, 1685, 1916, 1951.

P. CORNWALLISENSE D. Löve - 0483, 1068, 1072.

P. CORONA-SANCTI-STEPHANI Zapal. - 1209.

P. CROCEUM Ledeb. - 0653, 0654, 0894, 0895, 1190, 1421, 1956.

Alkaloids - 1951.

P. CURVISCAPUM Nabel. - 0019, 0353, 0354, 1983.

P. CYLINDRICUM Cullen - 0353, 0354.

P. DAHLIANUM Nordh. - 0378, 0483, 0917, 0918, 1067, 1068, 1069, 1070, 1209, 1283.

P. DECAISNEI Hochst. & Steud. ex Boiss. - 0211, 0290, 0354, 0532, 0894, 1223, 1761.

Alkaloids - 1567.

P. DESERTORUM Grossh. - 0483, 1322, 1744.

P. DIVERGENS Fedde & Bornm. - 1761.

P. DUBIUM L. - 0005, 0006, 0019, 0020, 0085, 0093, 0115, 0163, 0170, 0211, 0239, 0265, 0274, 0276, 0286, 0290, 0293, 0301, 0327, 0335, 0341, 0343, 0344, 0345, 0353, 0354, 0355, 0378, 0389, 0407, 0453, 0458, 0481, 0483, 0546, 0547, 0572, 0583, 0598, 0610, 0640, 0642, 0650, 0651, 0658, 0659, 0660, 0661, 0668, 0674, 0680, 0692, 0717, 0726, 0737, 0743, 0789, 0813, 0851, 0852, 0894, 0901, 0923, 0941, 0942, 0943, 0993, 1017, 1018, 1019, 1048, 1050, 1051, 1069, 1093, 1112, 1113, 1141, 1142, 1143, 1144, 1145, 1159, 1190, 1196, 1209, 1223, 1258, 1287, 1322, 1409, 1421, 1445, 1465, 1497, 1512, 1517, 1524, 1525, 1527, 1528, 1556, 1562, 1597, 1639, 1679, 1707, 1736, 1744, 1752, 1761, 1774, 1785, 1789, 1869, 1908, 1920, 1925.

Alkaloids - 0105, 0106, 0993, 1255, 1256, 1434, 1681, 1682, 1683, 1916, 1951.

P. EROSULUM Jord. - 0481.

P. FAURIEI Fedde - 0483, 0849, 1291.

P. FEDDEI O. Schwarz

Alkaloids - 1376, 1378, 1916.

P. FLORIBUNDUM Desf. - 0019, 0085, 0276, 0389, 0483, 0828, 0849, 1744, 1869, 1983.

Alkaloids - 0828, 0938, 1951.

P. FREEDMANIANUM D. Löve - 1072.

P. FUGAX Poir. - 0019, 0353, 0354, 0355, 0389, 0483, 0851, 1190, 1785, 1869.

Alkaloids - 0994, 1373, 1374, 1432, 1433, 1683, 1916, 1950, 1951.

P. GARIEPINUM Burch. ex DC. - 0389, 0441.

P. GAUBAE Cullen & Rech. f. - 0354.

P. GLAUCUM Boiss. & Hausskn. - 0006, 0019, 0052, 0085, 0211, 0265, 0353, 0354, 0355, 0378, 0483, 0532, 0650, 0668, 0824, 0849, 0993, 1208, 1498, 1597, 1744, 1785, 1789, 1983.

Alkaloids - 0351, 1353, 1354, 1356, 1376, 1382, 1433, 1567, 1575, 1686, 1916.

P. GRACILE Boiss. - 0211, 0353, 0532.

Alkaloids - 1434, 1567, 1916.

P. GURLEKENSE Stapf - 0481.

P. HALOPHILUM (Fedde) Cullen - 0354.

P. HELDREICHII Boiss. - 0211, 0483, 0650, 0849, 1744.

Alkaloids - 1433, 1916.

P. HIRTO-DUBIUM Fedde - 0481.

P. HISPIDUM Desf. ex Elkan - 0341, 0849, 1159.

Alkaloids - 1132.

P. HOOKERI Baker ex Hook. f. - 0483.

P. HORRIDUM DC. (= aculeatum) - 0389, 0441.

P. HULTENII Knaben - 0483.

P. HUMIFUSUM Fedde - 0481.

P. HUMILE Fedde - 0481, 0483, 0484, 0485, 1223, 1691, 1761, 1984.

P. HUNGARICUM Borb. - 0218.

P. HYBRIDUM L. - 0005, 0019, 0061, 0115, 0136, 0211, 0239, 0265, 0286, 0293, 0327, 0345, 0353, 0354, 0355, 0389, 0437, 0441, 0453, 0483, 0501, 0547, 0650, 0651, 0658, 0660, 0661, 0674, 0680, 0692, 0726, 0789, 0849, 0923, 0993, 1070, 1073, 1093, 1112, 1141, 1142, 1145, 1190, 1209, 1223, 1248, 1287, 1322, 1409, 1421, 1445, 1465, 1470, 1497, 1512, 1517, 1524, 1744, 1752, 1761, 1983, 1984.

Alkaloids - 0993, 1350, 1402, 1684, 1916.

P. HYOSCYAMIFOLIUM Boiss. & Hausskn. ex Boiss. - 0211.

P. INTEGRIFOLIUM Viguier - 0335, 0389, 0481, 1869.

P. INTERMEDIUM DC. - 1421.

Alkaloids - 1757, 1916.

P. INVOLUCRATUM Pop. - 1421.

P. KERNERI Hayek - 0006, 0483, 1209, 1520.

P. KLUANENSE D. Löve - 1071, 1072.

P. LACERUM Pop. - 0353, 0354, 0355, 1421.

P. LAESTADIANUM (Nordh.) Nordh. - 0378, 0483, 0729, 1067, 1069, 1209.

P. LAEVIGATUM Bieb. - 0211, 0389, 1208, 1209, 1322, 1421, 1489.

P. LAPPONICUM (A. Tolm.) Nordh. - 0006, 0378, 0483, 0729, 0917, 0918, 1067, 1069, 1209, 1283, 1421.

Alkaloids - 0201, 1916.

P. LASIOTHRIX Fedde - 0353, 0354, 1421.

P. LATERITIUM C. Koch - 0182, 0211, 0353, 0378, 0483, 0668, 0849, 1070, 1744, 1752, 1785, 1941.

Alkaloids - 0993, 1350, 1428, 1575, 1916.

P. LECOQII Lamotte - 0006, 0020, 0293, 0327, 0483, 0658, 0659, 0660, 0661, 0692, 0849, 1141, 1142, 1144, 1145, 1209, 1409, 1524, 1527, 1752, 1925.

P. LEDEBOURIANUM Lundstr. - 1075, 1421.

P. LEIOCARPUM Turcz. - 1421.

P. LEMMONII Greene - 0481.

P. LIBANOTICUM Boiss. - 0211.

P. LISAE N. Busch - 1421.

P. LITWINOWII Fedde ex Bornm. - 0483, 1421, 1556.

Alkaloids - 1434, 1916.

P. LUTEO-RUBRUM Jord. - 0335.

P. MACOUNII Greene - 0378, 0483, 0729, 1072.

P. MACROSTOMUM Boiss. & Huet ex Boiss. - 0019, 0211, 0353, 0354, 0849, 1190, 1209, 1421, 1498, 1556, 1983.

Alkaloids - 1434, 1916, 1951.

P. MAEOTICUM Klokov ex Klokov & Wissjul. - 1209.

P. MAIREI Battand. - 0789, 0849.

P. MALVIFLORUM Doum. - 0789, 1093, 1465.

P. MICROCARPUM DC. - 0389, 0742, 0934, 1421.

P. MIYABEANUM Tatewaki ex Mijabe & Tatewaki - 0849.

P. MODESTUM Jord. - 0481, 0674.

P. MONANTHUM Trautv. - 0355, 0650, 0849, 1421, 1597.

Alkaloids - 1428, 1434, 1916.

P. NIGRO-FLAVUM D. Löve - 1072.

P. NIGROTINCTUM Fedde - 0674, 0941, 1209, 1497.

P. NIVALE A. Tolm. - 1421, 1800.

P. NORDHAGENIANUM A. Löve - 0483, 0849, 1067, 1068.

P. NUDICAULE L. - 0006, 0048, 0050, 0061, 0065, 0079, 0085, 0138, 0190, 0211, 0240, 0265, 0276, 0344, 0354, 0378, 0389, 0454, 0455, 0457, 0458, 0480, 0483, 0492, 0494, 0650, 0652, 0653, 0654, 0656, 0657, 0663, 0717, 0726, 0729, 0742, 0828, 0849, 0860, 0893, 0918, 0986, 0993, 1008, 1036, 1053, 1070, 1074, 1136, 1189, 1249, 1258, 1266, 1409, 1436, 1466, 1470, 1556, 1660, 1722, 1744, 1752, 1785, 1794, 1800, 1935.

Alkaloids - 0004, 0213, 0414, 0504, 0505, 0656, 0828, 1129, 1130, 1430, 1916.

P. OBTUSIFOLIUM Desf. - 0341, 0389, 1869.

P. OCCIDENTALE (Markgraf) Hess, Land., Hirz. - 0692.

P. OCELLATUM Woron. - 1421.

P. OFFICINALE C. C. Gmel. (= somniferum) - 1073.

P. OREOPHILUM Rupr. - 0483, 0755, 0849, 1421, 1660, 1744.

Alkaloids - 0351, 0993, 1103, 1104, 1130, 1132, 1350, 1356, 1375, 1377, 1378, 1379, 1380, 1381, 1382, 1430, 1573, 1916.

P. ORIENTALE L. - 0006, 0061, 0068, 0078, 0085, 0138, 0203, 0204, 0211, 0223, 0265, 0271, 0279, 0307, 0330, 0344, 0353, 0354, 0355, 0358, 0361, 0363, 0378, 0384, 0389, 0419, 0441, 0447, 0451, 0458, 0478, 0483, 0492, 0494, 0532, 0638, 0650, 0670, 0698, 0717, 0733, 0745, 0752, 0753, 0754, 0796, 0845, 0849, 0851, 0860, 0874, 0901, 0922, 0986, 0993, 1032, 1062, 1063, 1064, 1065, 1070, 1093, 1114, 1118, 1140, 1150, 1156, 1190, 1209, 1210, 1231, 1248, 1291, 1293, 1297, 1322, 1336, 1339, 1341, 1397, 1409, 1421, 1458, 1470, 1520, 1556, 1597, 1679, 1733, 1752, 1762, 1766, 1779, 1783, 1785, 1812, 1869, 1884, 1934, 1936, 1937, 1938, 1939, 1942.

Alkaloids - 0116, 0119, 0120, 0121, 0385, 0394, 0617, 0906, 0936, 0937, 0993, 1254, 1263, 1350, 1360, 1361, 1425, 1427, 1429, 1430, 1431, 1557, 1568, 1673, 1729, 1731, 1779, 1780, 1786, 1841, 1916.

Cultivars - 0046, 0292, 0359, 0360, 0362, 0364, 0443, 0496, 0529, 0647, 1060, 1061, 1257, 1631, 1848, 1913.

P. PAEONIFLORUM Hort. ex Correa - 0265, 1243, 1442.

Alkaloids - 0212.

P. PANNOSUM O. Schwarz

Alkaloids - 1387.

P. PAUCIFOLIATUM (Trautv.) Fedde - 0353, 1190, 1421, 1744.

Alkaloids - 1916, 1951.

P. PAVONINUM Fisch. & C. A. Mey. - 0006, 0085, 0113, 0211, 0276, 0290, 0354, 0355, 0378, 0483, 0650, 0849, 0894, 0915, 1322, 1421, 1785, 1956.

Alkaloids - 0993, 1402, 1575, 1684, 1916.

P. PERSICUM Lindl. - 0019, 0211, 0355, 0483, 0849, 1421, 1744, 1785.

Alkaloids - 0435, 0994, 1372, 1373, 1374, 1426, 1916.

P. PILOSUM Sibth. & Sm. - 0006, 0085, 0211, 0265, 0353, 0355, 0389, 0441, 0483, 0650, 0849, 1500, 1744.

Alkaloids - 0993, 1350, 1428, 1434, 1916.

P. PINNATIFIDUM Moris - 0239, 0341, 0378, 0482, 0483, 0674, 0789, 0849, 0923, 1093, 1209, 1409, 1465, 1744.

P. PIPTOSTIGMA Bienert ex Fedde - 0354.

P. POLARE (Tolm.) Perfiljev - 0276, 0849.

P. POLYCHAETUM Schott & Kotschy - 0211, 0353.

Alkaloids - 1373, 1374, 1916.

P. POLYTRICHUM Boiss. & Kotschy - 0211, 0481, 0485, 1073, 1984.

P. POSTII Fedde - 0353, 0481.

P. PSEUDOCANESCENS Pop. - 0849, 1421.

Alkaloids - 1387, 1916.

P. PSEUDO-ORIENTALE Medvedev - 0849.

P. PSEUDO-STUBENDORFII Pop. - 1421.

P. PULVINATUM A. Tolm. - 1421.

P. PYGMAEUM Rydb. - 0378, 0483, 1071.

P. PYRENAICUM (L.) Willd. - 0085, 0389, 0483, 0491, 0849, 1287, 1445, 1869.

Alkaloids - 0993, 1129, 1130, 1360, 1430, 1916.

P. RADICATUM Rottb. - 0006, 0190, 0355, 0378, 0483, 0714, 0715, 0743, 0841, 0893, 0917, 0918, 0919, 0920, 0921, 0934, 1049, 1050, 1053, 1067, 1068, 1070, 1072, 1075, 1209, 1283, 1409, 1421, 1556, 1798, 1799.

Alkaloids - 0201, 1916.

P. RELICTUM (Lundstr.) Nordh. - 0378, 0483, 0729, 1067, 1283.

P. RHAETICUM Leresche ex Gremli - 0006, 1209, 1409.

P. RHOEAS L. - 0002, 0005, 0006, 0007, 0019, 0020, 0047, 0051, 0052, 0061, 0077, 0079, 0085, 0097, 0099, 0100, 0113, 0114, 0142, 0143, 0160, 0163, 0170, 0175, 0211, 0234, 0242, 0265, 0269, 0271, 0276, 0286, 0293, 0297, 0301, 0327, 0330, 0335, 0340, 0341, 0344, 0345, 0352, 0353, 0354, 0355, 0378, 0386, 0389, 0404, 0407, 0416, 0420, 0429, 0442, 0445, 0449, 0453, 0458, 0478, 0481, 0483, 0493, 0494, 0501, 0512, 0543, 0547, 0566, 0583, 0593, 0598, 0600, 0610, 0614, 0618, 0641, 0642, 0648, 0650, 0651, 0652, 0655, 0658, 0659, 0660, 0661, 0662, 0668, 0669, 0670, 0674, 0680, 0692, 0717, 0718, 0726, 0737, 0743, 0749, 0789, 0813, 0819, 0820, 0824, 0833, 0834, 0849, 0856, 0860, 0894, 0896, 0897, 0923, 0932, 0940, 0943, 0959, 0972, 0986, 1015, 1032, 1048, 1051, 1070, 1090, 1093, 1105, 1108, 1112, 1128, 1136, 1141, 1142, 1143, 1159, 1196, 1198, 1205, 1208, 1209, 1221, 1223, 1231, 1232, 1243, 1245, 1246, 1247, 1248, 1267, 1269, 1270, 1287, 1291, 1293, 1300, 1301, 1322, 1333, 1337, 1355, 1389, 1390, 1401, 1408, 1409, 1421, 1423, 1442, 1445, 1465, 1479, 1489, 1498, 1512, 1517, 1520, 1524, 1525, 1526, 1527, 1528, 1534, 1557, 1560, 1562, 1616, 1619, 1639, 1679, 1690, 1693, 1700, 1701, 1702, 1711, 1722, 1735, 1736, 1737, 1743, 1744, 1747, 1752, 1761, 1762, 1766, 1767, 1786, 1789, 1811, 1816, 1859, 1869, 1870, 1899, 1908, 1915, 1917, 1926, 1960, 1973, 1983, 1997.

Alkaloids - 0830, 0993, 1253, 1254, 1255, 1256, 1350, 1356, 1360, 1361, 1362, 1367, 1372, 1434, 1576, 1577, 1916, 1918.

P. RHOPALOTHECE Stapf - 0353, 0481, 1322.

P. ROBERTIANELLA Fedde - 0481.

P. ROGERSII Exell - 0019, 1498.

P. ROOPIANUM (Bordz.) Sosn. - 1421.

P. ROUBIAEI Viguier - 0389, 0481, 1869.

P. RUBRO-AURANTIACUM Fisch. ex Steud. - 0483, 0654, 0849, 1075, 1421.

P. RUPIFRAGUM Boiss. & Reut. - 0006, 0085, 0335, 0355, 0378, 0481, 0483, 0789, 0816, 0849, 0986, 1209.

Alkaloids - 0993, 1916.

P. SCAMMANIANUM D. Löve - 1072.

P. SCHINZIANUM Fedde - 0483, 0849, 1744.

P. SCHWEINFURTHII Fedde - 0481.

P. SENDTNERI Kerner ex Hayek - 0692, 1209, 1409.

P. SETIGERUM DC. - 0068, 0085, 0181, 0183, 0265, 0286, 0335, 0389, 0437, 0483, 0650, 0735, 0736, 0849, 0923, 1070, 1207, 1231, 1249, 1293, 1346, 1421, 1497, 1597, 1744.

Alkaloids - 0477, 0993, 1567, 1916.

P. SOMNIFERUM L.

Agronomy - 0003, 0016, 0017, 0021, 0022, 0023, 0025, 0026, 0027, 0028, 0033, 0040, 0042, 0043, 0045, 0047, 0049, 0053, 0055, 0057, 0059, 0063, 0073, 0076, 0080, 0081, 0082, 0083, 0084, 0089, 0092, 0094, 0095, 0101, 0103, 0108, 0109, 0139, 0140, 0141, 0145, 0149, 0153, 0156, 0159, 0178, 0189, 0191, 0203, 0222, 0225, 0226, 0227, 0268, 0277, 0284, 0287, 0289, 0308, 0309, 0310, 0312, 0320, 0331, 0333, 0334, 0337, 0338, 0342, 0344, 0365, 0376, 0395, 0398, 0399, 0403, 0405, 0417, 0422, 0425, 0426, 0436, 0444, 0472, 0490, 0520, 0541, 0545, 0550, 0551, 0552, 0555, 0559, 0560, 0565, 0568, 0569, 0574, 0591, 0596, 0601, 0626, 0627, 0635, 0636, 0637, 0643, 0677,

0678, 0679, 0689, 0694, 0703, 0704, 0707, 0712, 0732, 0763, 0764, 0765, 0774, 0775, 0776, 0779, 0780, 0781, 0782, 0783, 0788, 0790, 0793, 0795, 0815, 0817, 0818, 0836, 0837, 0847, 0860, 0861, 0864, 0868, 0869, 0870, 0877, 0878, 0880, 0881, 0882, 0883, 0884, 0908, 0911, 0924, 0931, 0944, 0946, 0947, 0952, 0953, 0954, 0957, 0968, 0969, 0988, 0991, 0997, 0998, 1001, 1003, 1004, 1005, 1006, 1010, 1012, 1016, 1022, 1023, 1024, 1027, 1035, 1044, 1045, 1057, 1058, 1059, 1080, 1082, 1083, 1094, 1095, 1099, 1101, 1118, 1121, 1133, 1138, 1166, 1172, 1177, 1178, 1179, 1193, 1194, 1201, 1202, 1219, 1225, 1237, 1250, 1251, 1259, 1280, 1281, 1282, 1286, 1294, 1295, 1305, 1306, 1309, 1310, 1311, 1312, 1333, 1335, 1393, 1394, 1403, 1462, 1469, 1484, 1486, 1494, 1496, 1509, 1513, 1514, 1515, 1523, 1533, 1536, 1539, 1540, 1550, 1552, 1553, 1558, 1582, 1607, 1608, 1609, 1611, 1623, 1624, 1627, 1629, 1632, 1639, 1641, 1642, 1650, 1651, 1652, 1657, 1661, 1662, 1663, 1669, 1672, 1675, 1676, 1680, 1694, 1705, 1706, 1708, 1720, 1721, 1724, 1725, 1726, 1727, 1737, 1739, 1746, 1753, 1759, 1781, 1784, 1788, 1796, 1804, 1809, 1818, 1819, 1820, 1822, 1827, 1831, 1833, 1837, 1839, 1846, 1847, 1850, 1854, 1855, 1856, 1857, 1858, 1860, 1866, 1871, 1878, 1879, 1880, 1885, 1886, 1887, 1888, 1889, 1890, 1891, 1892, 1893, 1896, 1909, 1910, 1911, 1914, 1933, 1949, 1953, 1957, 1966, 1969, 1970, 1977, 1978, 1986, 1998.

Alkaloids - 0010, 0030, 0031, 0038, 0068, 0069, 0096, 0117, 0118, 0123, 0124, 0125, 0126, 0127, 0128, 0129, 0130, 0131, 0132, 0151, 0155, 0187, 0194, 0196, 0206, 0207, 0220, 0230, 0231, 0245, 0246, 0247, 0259, 0275, 0281, 0300, 0315, 0319, 0321, 0322, 0328, 0348, 0367, 0369, 0372, 0375, 0387, 0388, 0393, 0400, 0423, 0459, 0460, 0461, 0462, 0463, 0464, 0466, 0467, 0468, 0469, 0470, 0471, 0489, 0490, 0567, 0628, 0629, 0632, 0679, 0682, 0690, 0695, 0696, 0697, 0703, 0716, 0723, 0750, 0757, 0759, 0760, 0772, 0801, 0802, 0822, 0842, 0857, 0886, 0888, 0903, 0905, 0906, 0907, 0909, 0910, 0949, 0950, 0981, 0993, 0997, 1007, 1011, 1028, 1029, 1031, 1085, 1098, 1115, 1116, 1123, 1149, 1161, 1162, 1165, 1169, 1181, 1182, 1183, 1192, 1203, 1217, 1260, 1265, 1271, 1772, 1315, 1316, 1317, 1340, 1352, 1358, 1360, 1361, 1368, 1369, 1370, 1392, 1399, 1406, 1435, 1456, 1477, 1487, 1488, 1490, 1491, 1510, 1529, 1530, 1548, 1567, 1568, 1583, 1584, 1587, 1588, 1589, 1592, 1594, 1613, 1614, 1620, 1628, 1647, 1665, 1671, 1713, 1723, 1729, 1731, 1749, 1780, 1782, 1784, 1785, 1786, 1803, 1805, 1806, 1810, 1840, 1841, 1843, 1849, 1876, 1877, 1916, 1927, 1928, 1932, 1955, 1988, 1989, 1991, 1992, 1994.

Anatomy & Morphology - 0011, 0012, 0061, 0167, 0168, 0169, 0170, 0180, 0183, 0336, 0383, 0407, 0411, 0458, 0465, 0487, 0488, 0514, 0538, 0590, 0592, 0603, 0604, 0610, 0668, 0730, 0758, 0762, 0834, 0835, 0846, 0848, 0879, 0935, 0945, 1030, 1052, 1089, 1090, 1114, 1137, 1163, 1199, 1222, 1231, 1246, 1248, 1293, 1396, 1438, 1442, 1443, 1470, 1520, 1549, 1556, 1564, 1590, 1615, 1638, 1656, 1715, 1793, 1808, 1859, 1861, 1882, 1884, 1952.

Chemistry (other than alkaloids) - 0006, 0008, 0041, 0060, 0072, 0173, 0217, 0238, 0332, 0356, 0392, 0510, 0513, 0521, 0540, 0650, 0673, 0702, 0721, 0791, 0802, 0803, 0804, 0805, 0806, 0807, 0812, 0825, 0840, 0867, 0904, 0914, 0973, 0974, 0975, 0976, 0977, 0978, 0979, 0980, 0992, 1000, 1056, 1150, 1151, 1152, 1153, 1197, 1252, 1298, 1413, 1415, 1416, 1418, 1454, 1464, 1481, 1493, 1518, 1595, 1617, 1618, 1659, 1696, 1697, 1737, 1764, 1765, 1922, 1954, 1960, 1964, 1974, 1975, 1976, 1987.

Cultivars - 0011, 0022, 0025, 0028, 0029, 0031, 0068, 0069, 0082, 0083, 0101, 0151, 0222, 0284, 0285, 0308, 0315, 0333, 0337, 0377, 0400, 0405, 0423, 0541, 0559, 0560, 0625, 0635, 0636, 0637, 0645, 0689, 0691, 0704, 0710, 0712, 0730, 0763, 0765, 0775, 0778, 0780, 0782, 0783, 0790, 0837, 0846, 0848, 0864, 0930, 0931, 0954, 0956, 0988, 1001, 1005, 1058, 1086, 1099, 1101, 1117, 1160, 1167, 1168, 1169, 1179, 1197, 1227, 1228, 1229, 1260, 1280, 1281, 1282, 1338, 1368, 1393, 1460, 1467, 1513, 1550, 1553, 1582, 1586, 1587, 1591, 1595, 1611, 1615, 1641, 1669, 1698, 1699, 1705, 1706, 1708, 1720, 1721, 1735, 1736, 1794, 1822, 1854, 1855, 1864, 1876, 1885, 1886, 1887, 1888, 1889, 1890, 1891, 1966, 1985.

Cytology - 0282, 0378, 0483, 0618, 0901, 0941, 0986, 1009, 1096, 1097, 1249, 1499, 1750, 1751, 1762, 1792, 1937.

Diseases and pests - 0007, 0013, 0033, 0034, 0035, 0036, 0066, 0074, 0075, 0087, 0088, 0093, 0097, 0138, 0144, 0146, 0148, 0152, 0158, 0161, 0163, 0192, 0193, 0214, 0215, 0216, 0219, 0221, 0228, 0232, 0233, 0235, 0236, 0237, 0240, 0263, 0269, 0270, 0274, 0276, 0288, 0294, 0295, 0296, 0297, 0298, 0302, 0314, 0316, 0323, 0324, 0325, 0326, 0329, 0343, 0350, 0352, 0366, 0379, 0380, 0381, 0382, 0386, 0396, 0397, 0406, 0408, 0409, 0413, 0424, 0428, 0429, 0431, 0438, 0440, 0442, 0450, 4086, 0502, 0506, 0522, 0525, 0528, 0548, 0549, 0555, 0558, 0566, 0576, 0578, 0579, 0584, 0585, 0587, 0594, 0599, 0612, 0620, 0621, 0622, 0623, 0624, 0642, 0644, 0652, 0665, 0671, 0672, 0684, 0685, 0686, 0687, 0688, 0706, 0718, 0719, 0737, 0751, 0768, 0769, 0770, 0786, 0826, 0827, 0853, 0871, 0872, 0873, 0874, 0875, 0876, 0889, 0890, 0892, 0898, 0899, 0900, 0912, 0928,

0929, 0932, 0960, 0961, 0962, 0963, 0964, 0965, 0966, 0970, 0971, 0983, 1013, 1048, 1051, 1054, 1066, 1076, 1077, 1078, 1084, 1106, 1109, 1120, 1124, 1126, 1127, 1134, 1135, 1136, 1146, 1147, 1148, 1154, 1167, 1170, 1171, 1173, 1180, 1184, 1191, 1195, 1198, 1204, 1211, 1212, 1214, 1215, 1216, 1218, 1220, 1224, 1233, 1234, 1235, 1236, 1241, 1242, 1243, 1244, 1245, 1273, 1274, 1275, 1276, 1277, 1285, 1288, 1299, 1302, 1303, 1307, 1308, 1313, 1318, 1319, 1320, 1321, 1323, 1324, 1325, 1326, 1329, 1330, 1331, 1332, 1338, 1342, 1343, 1344, 1345, 1391, 1395, 1424, 1440, 1444, 1455, 1467, 1468, 1483, 1485, 1492, 1503, 1504, 1505, 1507, 1508, 1517, 1542, 1543, 1544, 1545, 1546, 1547, 1554, 1555, 1560, 1579, 1580, 1597, 1598, 1599, 1600, 1601, 1602, 1603, 1604, 1605, 1606, 1610, 1616, 1621, 1622, 1625, 1626, 1630, 1633, 1643, 1644, 1649, 1653, 1678, 1679, 1688, 1703, 1712, 1714, 1716, 1717, 1719, 1733, 1754, 1757, 1763, 1766, 1768, 1795, 1797, 1815, 1834, 1838, 1851, 1852, 1853, 1874, 1881, 1899, 1902, 1919, 1931, 1946, 1947, 1948, 1958, 1962, 1963, 1965, 1979, 1980, 1981, 1982, 1995, 1997, 1999, 2000.

Genetics - 0024, 0031, 0068, 0143, 0181, 0184, 0200, 0218, 0307, 0311, 0338, 0373, 0374, 0377, 0539, 0691, 0705, 0708, 0710, 0711, 0713, 0735, 0736, 0746, 0767, 0777, 0778, 0823, 0824, 0838, 0839, 0845, 0849, 0854, 0855, 0862, 0930, 0948, 0951, 0956, 1020, 1021, 1063, 1064, 1065, 1117, 1128, 1164, 1168, 1185, 1186, 1187, 1188, 1200, 1203, 1213, 1267, 1400, 1422, 1439, 1460, 1461, 1500, 1511, 1521, 1581, 1585, 1586, 1591, 1593, 1677, 1698, 1699, 1779, 1783, 1814, 1872, 1873, 1926, 1934, 1935, 1936, 1938, 1939, 1940, 1985.

Physiology - 0028, 0029, 0068, 0090, 0147, 0150, 0164, 0185, 0285, 0400, 0433, 0474, 0475, 0489, 0495, 0511, 0524, 0526, 0588, 0589, 0602, 0605, 0606, 0611, 0662, 0695, 0722, 0810, 0811, 0865, 0866, 0925, 0927, 0982, 1025, 1026, 1055, 1087, 1088, 1091, 1238, 1239, 1240, 1258, 1289, 1290, 1410, 1411, 1412, 1414, 1417, 1419, 1446, 1447, 1448, 1449, 1450, 1451, 1452, 1453, 1481, 1482, 1495, 1541, 1551, 1636, 1664, 1741, 1742, 1743, 1758, 1807, 1845, 1906, 1967, 1971, 1996.

Taxonomy - 0002, 0079, 0085, 0110, 0115, 0136, 0211, 0239, 0242, 0265, 0290, 2093, 0327, 0340, 0341, 0345, 0347, 0353, 0354, 0355, 0368, 0370, 0389, 0404, 0441, 0449, 0481, 0482, 0517, 0544, 0564, 0583, 0674, 0701, 0789, 0813, 0894, 0923, 1073, 1086, 1092, 1093, 1105, 1112, 1209, 1221, 1223, 1287, 1291, 1322, 1388, 1409, 1421, 1441, 1445, 1465, 1480, 1512, 1528, 1537, 1566, 1640, 1654, 1709, 1710, 1711, 1722, 1735, 1736, 1752, 1774, 1789, 1794, 1908, 1973, 1983.

P. SPICATUM Boiss. & Bal. ex Boiss. - 0211, 0353, 0355, 1789.

P. STEFANSSONIANUM A. Löve - 0483.

P. STEINDORSSONIANUM A. Löve - 0483, 1067.

P. STIPITATUM Fedde - 0481, 0674, 1497.

P. STRICTUM Boiss. & Bal. ex Boiss. - 0211, 0353, 0355, 0483, 1497, 1744.

P. STRIGOSUM (Boenn.) Schur - 0407, 0481, 0674, 1322, 1421, 1497, 1761, 1925.

Alkaloids - 1684, 1916.

P. STUBENDORFII A. Tolm. - 1421.

P. STYLATUM Boiss. & Bal. ex Boiss. - 0211, 0353, 0481.

P. SUAVEOLENS Lapeyr. - 0483, 1209.

Alkaloids - 1130, 1360, 1916.

P. SUBADPRESSIUSCULO-SETOSUM Fedde - 0481.

P. SUBPIRIFORME Fedde - 0481, 0483, 0485, 1691, 1984.

P. SUBUMBILICATUM Fedde - 0481, 0674.

P. SYRIACUM Boiss. & Blanche ex Boiss. - 0353, 0481, 0482, 0483, 0485, 1556, 1691, 1984.

P. TALYSCHENSE Grossh. - 1421.

P. TAURICOLA Boiss. - 0019, 0211, 0483, 0849, 1983.

Alkaloids - 1433, 1916.

P. TENELLUM A. Tolm. - 1421, 1800.

P. TENERIFAE Fedde - 0481.

P. TENUE Ball - 0115.

P. TENUIFOLIUM Boiss. & Hohen. ex Boiss. - 0481, 0483.

P. TENUISSIMUM Fedde - 0481, 0482, 0483, 0674.

P. THAUMASIOSEPALUM Fedde - 0481.

P. TIANSCHANICUM Pop. - 1421.

P. TRILOBUM Wallr. (= rhoeas ?) - 0389, 0481.

P. TRINIIFOLIUM Boiss. - 0211, 0353, 0354, 0355, 0378, 0650, 0849, 1322, 1744.

Alkaloids - 0994, 1373, 1374, 1432, 1684, 1916.

P. TUBULIFERUM Fedde - 0019.

P. TUNETANUM Fedde - 0481.

P. TURBINATUM Fresen. - 0211, 0441.

P. UMBONATUM Boiss. - 0211, 0481.

P. UMBROSUM Hort. (= rhoeas ?) - 0047, 0483, 0849, 1208, 1744.

P. VIRCHOWII Asch. & Sint. ex Boiss. - 0353, 1497.

PHARMACOLOGY - 0229, 0303, 0320, 0344, 0401, 0418, 0556, 0573, 0607, 0680, 0861, 0863, 0989, 0990, 1278, 1297, 1314, 1346, 1425, 1435, 1593, 1756, 1901.

PHENOLOGY - 0016, 0017, 0040, 0045, 0057, 0059, 0149, 0164, 0774, 0864, 1003, 1027, 1080, 1138, 1157, 1393, 1460, 1476, 1558, 1591, 1669, 1675, 1676, 1822, 1854, 1864, 1893, 1913.

PHYLOGENY - 0109, 0517, 0518, 0658, 0683, 0748, 0794, 0918, 1009, 1110, 1111, 1284, 1420, 1499, 1567, 1729, 1744, 1977.

PHYSIOLOGY (See also Chemistry, Fruit, Oil, Seed) - 0040, 0068, 0147, 0164, 0332, 0682, 0722, 0810, 0867, 0904, 0907, 0968, 0985, 1026, 1238, 1239, 1240, 1289, 1304, 1351, 1408, 1807, 1975, 1982, 1986, 1996.

Anesthesia, Effect of - 1408.

Antibiotic properties - 0065, 0067, 1000.

Excised ovules - 0811, 1087, 1088, 1419.

Excised placentae - 1410, 1411, 1412, 1413, 1419.

Growth retardants - 0925.

Hormones - 0090, 0142, 0602, 0605, 0606, 1015, 1024, 1025, 1055, 1417, 1742, 1743, 1767.

Insecticide properties - 0666.

Isotopes - 0356.

Ontogeny - 0332, 0474, 0475.

Photoperiodism - 0028, 0029, 0282, 0865, 1055, 1074, 1169, 1582, 1845, 1967.

Photosynthesis - 1447, 1448, 1551.

Plastids - 1750, 1751.

Respiration - 0811, 1091, 1971.

Ripening - 0150, 0285, 0524, 1416, 1417, 1418, 1446, 1447, 1448, 1452.

Root - 0433, 1758.

Shading effects - 0489, 0501, 0588.

Tissue culture - 0540, 0628, 0927, 1481, 1482.

Topping - 0696, 1635, 1906.

Transpiration - 1446, 1449, 1450, 1451.

Wilting - 1741.

Wounding - 1495.

PHYTOGEOGRAPHY - 0320, 0455, 0478, 0485, 0681, 0918, 1158, 1393, 1826, 1864, 1920.

POLITICS - 0102, 0103, 0399, 0520, 0731, 1003, 1006, 1079, 1278, 1328, 1403, 1561, 1823, 1825, 1831, 1930.

POLLEN

Abortion - 1097.

Chemistry - 0114.

Germination - 0595, 0835.

Morphology - 0446, 0447, 0749, 1556.

Yield - 1336.

RELIGION - 0399.

SEED (See also Utilization) - 0032, 0053, 0063, 0067, 0319, 0464, 0510, 0513, 0524, 0602, 0625, 0808, 0810, 0834, 0835, 0967, 1020, 1056, 1087, 1090, 1157, 1301, 1414, 1415, 1419, 1441, 1442, 1733, 1963, 1965.

Adulteration - 0613, 1854.

Alkaloid content - 0319, 1340, 1435, 1452, 1453, 1454, 1589, 1840.

Anatomy and Morphology - 0109, 0170, 0265, 0370, 0407, 0458, 0610, 0658, 0935, 0999, 1008, 1114, 1137, 1163, 1520, 1588, 1615, 1638, 1715, 1739, 1752, 1859, 1861.

Color - 0513, 0679, 0730, 1021, 1443, 1460, 1461, 1585, 1615.

Composition - 0173, 0791, 0867, 1161, 1197, 1464, 1493, 1595, 1629, 1764, 1765, 1974, 1975, 1976.

Disinfectants - 0158, 0472, 0929, 1212, 1214, 1467, 1468.

Dispersal - 1396, 1516.

Dormancy - 0659.

Harvest - 0425, 0520, 0860, 1669.

Ontogeny - 0812, 1410, 1443.

Pretreatment - 0142, 0925, 1026, 1657, 1996.

Radiation effects - 0526, 1165, 1781.

Set - 0090.

Storage - 0278, 0600, 0896, 0897, 0939, 1173, 1258, 1670.

Ultrasonics - 0570.

Vernalization - 0707, 0982, 1022, 1289, 1290.

Weight - 1438.

SEEDLING - 0027, 0033, 0034, 0035, 0158, 0348, 0398, 0433, 0495, 0659, 0803, 0935, 0973, 0974, 0979, 0985, 1123, 1160, 1161, 1162, 1368, 1589, 1792, 1971.

STATISTICS

General - 0058, 0436, 0731, 1476, 1680, 1822, 1824, 1828, 1829, 1836, 1968.

Production by country

Afghanistan - 1403, 1821.

Argentina 1403, 1821.

Austria - 0092.

Bulgaria - 0092, 1821.

Burma - 1821.

Chile - 1408, 1821.

China - 0799, 1403, 1680, 1821.

Czechoslovakia - 0092.

Egypt - 0799, 1403, 1821.

France - 0092.

Germany - 1821.

Greece - 1821.

Hungary - 0092, 0376, 1821.

India - 1403, 1476, 1674, 1821, 1836, 1968.

Indochina - 1403.

Iran - 0799, 1403, 1674, 1821.

Italy - 0308, 1821.

Japan - 1403, 1821.

Korea - 1403, 1821.

Laos - 1821.

Mexico - 1403, 1821.

Nepal - 1821.

Pakistan - 1821.

Poland - 0092, 0436.

Rumania - 0092.

Spain - 1821.

Thailand - 1403, 1821.

Tunisia - 1403, 1821.

Turkey - 0799, 1403, 1821, 1822.

Yugoslavia - 0092, 0799, 1821.

U.S.S.R. - 1403, 1821.

STEM - 0668, 0794, 1743.

STRAW (See also Utilization)

Chemistry - 0058, 0096, 0101, 0196, 0198, 0217, 0220, 0230, 0231, 0367, 0377, 0387, 0392, 0678, 0703, 0704, 0781, 0822, 0988, 1149, 1181, 1265, 1370, 1490, 1529, 1530, 1617, 1618, 1667, 1668, 1669, 1723, 1749, 1803, 1805, 1806, 1877, 1878, 1892, 1932, 1985, 1992.

Economics - 0947, 1509, 1669, 1723.

Fermentation - 1085.

Harvest - 0268.

Storage - 0230, 0632, 1529, 1530, 1613.

Utilization - 0432, 0629, 1006.

TAXONOMY - 0006, 0046, 0047, 0076, 0085, 0110, 0165, 0166, 0308, 0344, 0355, 0357, 0370, 0389, 0404, 0441, 0448, 0449, 0456, 0478, 0480, 0481, 0482, 0516, 0517, 0518, 0532, 0608, 0610, 0625, 0639, 0653, 0657, 0658, 0683, 0729, 0735, 0748, 0846, 0848, 0917, 0920, 0921, 0942, 1034, 1101, 1143, 1144, 1189, 1208, 1293, 1341, 1393, 1420, 1433, 1499, 1525, 1534, 1537, 1591, 1744, 1798, 1801, 1808, 1822, 1864, 1869, 1917, 1977.

Chemotaxonomy - 1737, 1785, 1786, 1842.

Geography (including floras)

Albania - 0674.

Algeria - 0115, 1465.

Argentina - 0301, 0894, 0895.

Australia - 0136, 0286, 0437, 0453.

Austria - 1112, 1441, 1789.

Bermuda - 0242.

Bulgaria - 0674.

Canada - 1068, 1071, 1072, 1108, 1525, 1640.

Chile - 1401.

China - 0893, 1735.

Corsica - 0239.

Costa Rica - 1709.

Czechoslovakia - 1112.

Dominican Republic - 1205.

Egypt - 1223, 1761.

El Salvador - 1710.

Europe - 1209, 1409.

Finland - 1075, 1799.

France - 0341.

Germany - 0651, 1112, 1789.

Great Britain - 0293, 0327, 0658, 1142.

Greece - 0674, 1497.

Greenland - 0190, 1068.

Guatemala - 1711.

Guinea - 1405.

Haiti - 0099.

Hungary - 1112, 1287, 1512.

Iceland - 1067.

India - 0368, 0640, 0726, 1086, 1566.

Indochina - 0544.

Indonesia - 0701.

Iran - 0290, 0354.

Iraq - 0019, 1498, 1983.

Israel - 0485, 1073, 1691, 1984.

Italy - 0091, 1105.

Japan - 1291.

Java - 0079.

Malay - 1722.

Mexico - 0564.

Mongolia - 0654.

Morocco - 0789.

Nicaragua - 1480.

North Africa - 1092, 1093.

Norway - 0918, 1050, 1068, 1075, 1283, 1799.

Okinawa - 1693.

Pakistan - 0290.

Poland - 1112.

Portugal - 0345.

Rumania - 0674, 1445.

South Africa - 0667.

Spain - 0335, 0547, 0923, 1159.

Sweden - 0918, 1068, 1075, 1283, 1799, 1908.

Switzerland - 0692, 1789.

Syria - 1073.

Thailand - 0347.

Turkey - 0353, 1001.

U.S. - 0002, 0100, 0340, 0583, 0663, 0797, 0813, 1071, 1072, 1221, 1557, 1654, 1736, 1774, 1794, 1973.

U.S.S.R. - 0742, 0934, 1068, 1421, 1800, 1966.

Vietnam, North - 1388.

Yugoslavia - 0674.

UTILIZATION - 0399, 0434, 0445, 0532, 0542, 0680, 1046, 1057, 1082, 1118, 1174, 1302, 1321, 1328, 1421, 1463, 1476, 1760, 1777, 1839, 1869, 1972.

Flowers - 0051, 0052.

Forage - 0720.

Latex - 1268.

Oil - 0054, 0111, 0209, 0676, 0863, 1819.

Opium - 0045, 0303, 0308, 0543, 0717, 0877, 1080, 1202, 1476, 1637, 1674, 1704, 1745, 1814, 1912.

Papaver rhoeas - 1463.

Seed - 0026, 0032, 0063, 0064, 0513, 0733, 0774, 1494, 1501, 1533, 1607, 1695, 1753, 1861.

Straw - 0432, 0629, 1006, 1231.